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TECHNIK SERVICE NEWS

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Dear Readers,

We are living in a time of change – social, political and technological. This affects our industry, too, as it continues to face major challenges. At the same time, the new coalition agreement offers a glimpse of hope: the course set by the German government gives reason to believe that the transformation of the transport sector is not merely intended, but also underpinned with tangible funding programmes and investments. This is an important signal for the local public transport sector and, in turn, us as a supplier. In an industry built on investment cycles that span decades, if there's one thing we need more than anything else, it's political reliability.

This reliability is crucial when it comes to the targeted advancement of future-proof technologies – when choosing the right refrigerant, for example. The latest regulatory developments, especially the F-Gas Regulation and the impending ban on PFAS, distinctly show that there is a need for viable alternatives. It's already clear to us that natural refrigerants such as CO2 and propane are not a vision of the future, but rather the technology of tomorrow. In our title story "Air conditioning in times of change", we delve deeper into this topic.

In other news, we have a real highlight coming up with the busworld exhibition in Brussels. Our preparations are already well under way. We look forward to seeing you there and presenting our latest developments and innovative solutions – live, direct and in person.

We hope you enjoy reading this edition and we look forward to speaking to you face to face in the future – whether at an exhibition, as part of a project or while collectively shaping the future of bus transportation.

Best wishes

Frank Färber
Sales Director

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Air conditioning in times of change

Growing pressure on conventional refrigerants

Air conditioning in buses is an essential feature of modern public transport. However, the refrigerants used in air-conditioning systems are increasingly coming under pressure due to their impact on the environment. In particular, the impending ban on PFAS and the already effective F-Gas Regulation are forcing the industry to think differently.

The F-Gas Regulation and the phase-down scenario

EU Regulation No. 517/2014 on fluorinated greenhouse gases (F gases) aims at reducing greenhouse gas emissions globally. New car air-conditioning systems have not been allowed to be filled with the previously used refrigerant R134a (GWP = 1,430) since January 2017. For buses, no directives are currently in force that ban the use of climate-damaging refrigerants. However, the price of conventional refrigerants is increasingly on the rise due to what is known as the phase-down scenario outlined in the F-Gas Regulation and the artificial shortage it establishes. The phase-down takes into account not the quantity of refrigerant placed on the market in kilograms, but the so-called CO2 equivalent.

What does CO2 equivalent mean?

The CO2 equivalent is calculated by multiplying the GWP by the amount of refrigerant in kilograms.

Explanation of GWP (global warming potential)

Refrigerant R134a has a GWP of 1,430. This means that 1 kg of the refrigerant has the same impact on the greenhouse effect as 1,430 kg of CO2.

Sample calculation of a CO2 equivalent:

system filling quantity of 5.5 kg R134a * GWP 1,430 = 7,865 kg CO2 equivalent.

Low-GWP refrigerants as future-oriented solution

By using what are referred to as low-GWP refrigerants, the CO2 equivalent of all produced HFC refrigerants is expected to be reduced in the future. In practice, this means that manufacturers and importers have to choose between reducing quantities accordingly or switching to refrigerants with lower GWP values.

PFAS ban: further restrictions for established refrigerants

This is exacerbated by the impending PFAS ban. Per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals used in a variety of applications, including refrigerants. Due to their persistence (stability and durability) and toxicity in the environment,

PFAS are increasingly being banned. This concerns, in particular, refrigerants such as R1234yf and R134a, which are still used in many air-conditioning systems. The effects of this are already being felt in the market (price increases, reduced availability of the refrigerants) and are now opening doors to natural and ecofriendly refrigerants such as R290 (propane), which has a GWP of 3, and R744 (CO2), which has a GWP of 1.

CO2 (R744)

CO2 has been used as a refrigerant in bus air-conditioning systems for more than seven years now. The biggest obstacle to implementing these new systems was the refrigerant's high levels of system pressure of up to 120 bars. By comparison, the system pressure of R134a is approximately 12 bars, depending on operating state. Due to their chemical properties, CO2 systems are excellently suited for use as heat pumps for warming electric buses in low and moderate ambient temperatures. If outside temperatures are high, however, their energy efficiency in cooling mode sinks, meaning more energy has to be taken from the batteries, thus reducing the vehicle's range.

Propane (R290)

Similar to CO2, propane is a natural refrigerant and boasts superb thermodynamic properties across a wide temperature range. In view of this, propane (R290) is an excellent refrigerant for both low and high ambient temperatures and is therefore well suited to the operation of both heat pumps and air conditioners. Propane is already used in virtually every refrigerator, in modern heat pumps installed in buildings and also in the railway sector. The greatest obstacle to the use of R290 in air-conditioning units is the fact that it is easily inflammable and heavier than air, which can lead to it collecting in the floor area (in vehicle interiors, workshop pits). It is therefore essential that the air-conditioning systems are designed as closed systems with permanently sealed connections. A safety concept must also be drawn up which guarantees that the critical amount of refrigerant in the passenger compartment is not exceeded at any time and that no dangerous source of ignition is located near the propane unit. Refrigerant lines have to be protected from heat and spark formation, among other things, and they are not to run through the passenger compartment. All things considered, however, propane does have its advantages when compared directly to CO2.

Good to know

Despite propane being flammable, countless gas heaters are operated safely across Europe. Gas burners are also used in motorhomes. These vehicles carry significantly larger quantities of gas than the amount needed for vehicle air-conditioning systems.

Switch to alternative refrigerants in public buses and coaches

Local electric buses tend to be fitted with electric air-conditioning systems that are operated using natural or synthetic refrigerants. The switch to more environmentally friendly refrigerants such as CO2 (R744) or propane (R290) is technically possible here and is already in motion. In the case of diesel-powered public buses and coaches which are still in operation or are still being newly registered at present, certain considerations have to be kept in mind such as servicing existing systems (refilling refrigerants) and switching to alternative systems with ecofriendly refrigerants. HFOs (hydrofluoroolefins) may represent a possible solution here. These refrigerants have a much lower GWP than conventional F gases and can often be used as drop-in solutions for existing systems. Arrangements may have to be made in advance for switching out some components in order to facilitate refitting.

In short: the future lies in natural and low GWP refrigerants

In summary, the impending PFAS bans and the already effective F-Gas Regulation present bus fleet operators with significant challenges. The switch to more environmentally friendly refrigerants is, however, possible and necessary. In the long term, the sector will increasingly have to look to natural refrigerants and synthetic alternatives with a low GWP in order to satisfy the statutory provisions while also ensuring the efficiency and safety of air-conditioning systems.

Refrigerant number	Composition	ODP	GWP	Safety classification	Flouid group
R134a	$C_2H_2F_4$	0	1430	A1	2
R513A	R134a/R1234yf[2]	0	631	A1	2
R1234yf	$C_3H_2F_4$	0	4	A2L	1
R407C	R134a/R125/R32	0	1774	A1	2
R744	CO_2	0	1	A1	2
R290	C_3H_8	0	3	A3	1
R729	Luft	0	0	A1	2
R1270	C_3H_6	0	3	A3	1

The various refrigerants and their global warming potential (GWP).

2025 trade fair calendar:

Spheros presents future-oriented heat management solutions for buses

After getting off to a successful start in Berlin at the Mobility Move in the beginning of April, Spheros has an exciting year of exhibitions ahead in 2025. With its innovative and sustainable heat management solutions for buses, the company is set to take part in several major industry events. Of these, the spotlight is on two exhibitions in particular: the UITP Global Public Transport Summit in Hamburg and the busworld in Brussels – the latter being the leading bus trade fair in the world and the absolute highlight of the year.

Looking back: Mobility Move 2025 – expert exchange

Together with the VDV Electric Bus Conference, the Mobility Move held at Berlin's Estrel Hotel brought together experts from across Germany. For Spheros, the event presented an ideal platform over which to talk to operators, transportation companies and partners in detail about current requirements concerning sustainable air-conditioning systems for electric buses. The focus was clearly on sustainable solutions for the mobility of tomorrow – a topic that proves to be a common thread throughout our trade fair calendar.

Looking ahead: UITP in Hamburg – focus on local mobility

From 15 to 17 June 2025, the global local transport sector will come together at the UITP in Hamburg. Spheros will be represented in hall A1 at stand A1126, where it will present solutions specifically tailored to the requirements of local public transport. These are centred around CO2-reducing technologies, energy-efficient air-conditioning systems for electric buses and the use of environmentally friendly refrigerants with a low GWP. Our aim: climate comfort for passengers and drivers that is also focused on sustainability and life-cycle costs – entirely in keeping with modern transport concepts for cities and municipalities.

Highlight of 2025: busworld in Brussels – a world premiere and our systems approach

From 3 to 9 October 2025, Brussels will form the centre of the bus industry. At the busworld, in hall 3, stand 317, Spheros will present not only future-oriented solutions for all climate conditions and every type of bus, but also a world premiere in the field of air-conditioning technology.

Our exhibition stand will be focused around our holistic systems approach, i.e. the fact that all our air-conditioning components are supplied together and from a single source. This is a key topic, especially in relation to the air conditioning of electric buses, as a holistic approach to thermal management draws on existing energy resources in the best possible way while increasing the buses' range. Customers can look forward to solutions that satisfy the highest requirements in terms of energy efficiency, life-cycle costs and passenger comfort.

Mobility move 2025 in Berlin.

The E-Cooler battery thermal management system with active and passive cooling for efficient operation..

Stop by our stand – we look forward to seeing you!
Whether for local transport networks or international bus markets, Spheros is helping shape the future of air conditioning in buses. See for yourself – visit us in Hamburg (hall A1, stand A1126) or at the busworld in Brussels (hall 3, stand 317).
We look forward to speaking to you!

The Fast-Way team and Spheros colleagues Carsten Schmidt, Frank Färber, Volker Schuster and Frank Stieber.

Ten years of the Fast-Way warehouse – efficiency, reliability and team spirit

Since being set up in 2015, the Fast-Way warehouse has established itself as a central distribution centre for the Spheros aftermarket across the whole of Europe. Boasting a combination of high product and parts availability and fast delivery times, it now provides a time-proven solution for all Spheros distribution partners.

Speed and transparency as success factors

More than 2,500 articles spanning everything from exhaust pipes to ignition spark generators can be ordered around the clock from the online portal. The Fast-Way warehouse handles dispatches daily, guaranteeing maximum speed and highest transparency. Whether burner heads, recirculation pumps or retrofit air conditioners: the warehouse delivers quickly and reliably, as and when needed. Stock is adjusted in line with seasonal peaks in demand, ensuring consistent delivery reliability.

Carsten Schmidt hands the ten-year award to Kai Gräwer and Frank Röse (both from the Fast-Way warehouse management team).

A decade of success – anniversary in Nürtingen

May 2025 marked ten years since the Fast-Way warehouse opened its doors in Nürtingen near Stuttgart. The anniversary was duly celebrated by the entire Fast-Way team together with Spheros guests Fabienne Ehmann (Marketing & Communications), Carsten Schmidt (General Manager Spheros Germany), Frank Färber (Sales Director) and Volker Schuster (After Sales Manager).

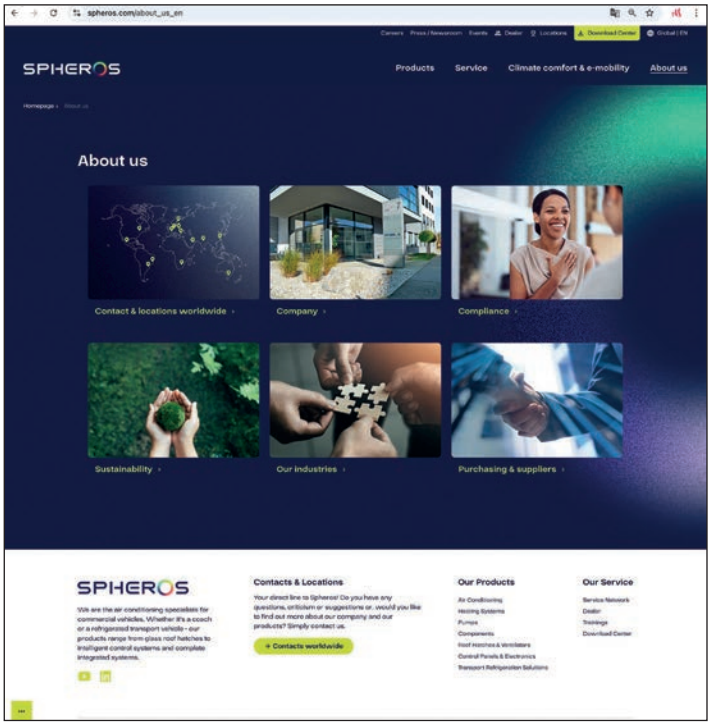
As a token of appreciation, Carsten Schmidt handed over an exclusively designed ten-year award and acknowledged the development of the warehouse in his speech – from its initial beginnings to its significance today in the European replacement parts business. Special mention was given to the team's uninterrupted availability, high level of service quality and impressive flexibility.

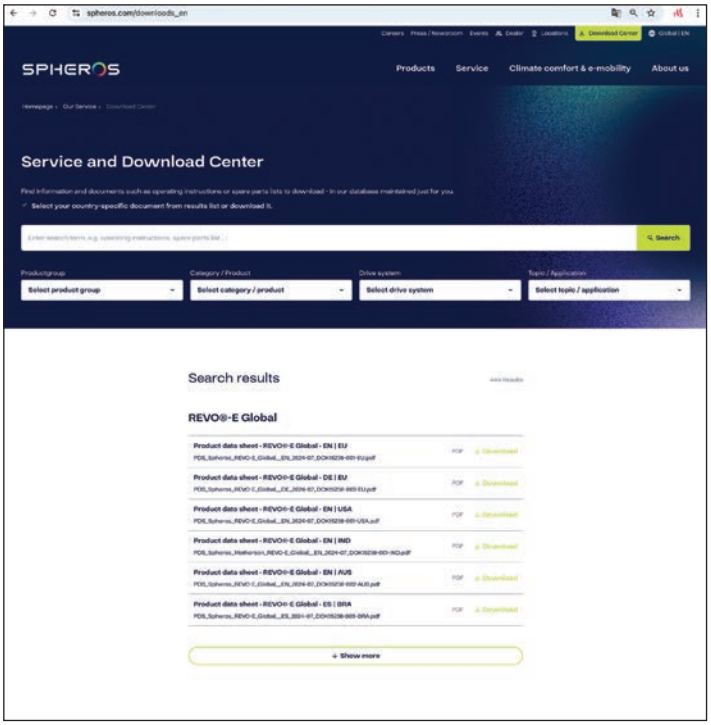
Moving forward together

The anniversary was not only a reason to celebrate, it also allowed a moment to reflect and look ahead. The past ten years have demonstrated the importance of a strong logistics centre for customer satisfaction and market success. Based on this foundation, the Fast-Way warehouse looks ahead with optimism – ready to continue pursuing fast ways for strong solutions.

Fresh, functional, user-friendly – the new Spheros website is live

Spheros has an all-new digital presence following a complete overhaul of its website: technically, visually and in terms of content. We wanted to provide our customers, partners and interested visitors with even clearer, quicker and more user-friendly ways of finding out about our products and solutions – on desktop and mobile devices alike.





Clear navigation, broader overview

The new Spheros website appeals with its modern design, clear structures and intuitive user prompts. Whether you are specifically looking for a particular product, want to hear about our latest news or want to access technical information, everything is just a couple of clicks away.

Content is arranged by topic and oriented towards the needs of our customers from the bus, transport cooling and other commercial vehicles sectors. This enables you to find exactly what is relevant to your application – from air-conditioning systems to thermal management, right over to intelligent control solutions.

New: the Spheros download centre

A special highlight of the new website is the completely new download centre. Only available since the latest changes, this function offers a huge amount of added value.

Central access to documents:
Specification sheets, brochures, product catalogues and certificates are now all stored in and retrievable from one place.

Targeted filter functions:
With the aid of intuitive search and filter options, you will find the right documents that are of relevance to your vehicle category or product line.

Always up to date
The documents are regularly updated, giving you access to the latest information at all times.

Direct downloads without diversions
No login, no registration. Simply select and download.
The download centre is ideal for technicians, purchasers, planners or service partners who want to access reliable information quickly.

More than just a website

With the relaunch, Spheros underscores its aspiration not only to supply innovative air conditioning and thermal management solutions, but also to offer digital services of the highest standards. The website will be regularly expanded, offering new functions, application notes, videos and products.

Take a look now

Visit us at **www.spheros.com** and see our new online presence for yourself. We are, of course, always here for you if you have any questions, feedback or suggestions.

The Spheros heating systems, water pumps and climate control modules are also used in the industrial, agricultural and construction sectors.

Going beyond buses: Spheros solutions for all kinds of applications

For almost 70 years now, the name Spheros has stood for innovative heat management solutions in the bus sector. As a long-standing partner of numerous well-known bus manufacturers, the company develops sustainable technologies that make an important contribution to the electrification of bus fleets around the world. In doing this, the focus is always placed on increasing efficiency, reducing emissions and minimising fuel consumption.

But that's not all that Spheros is about: the high-quality components – especially heating systems, intelligent water pumps and climate control modules – have long been used in other areas. They are relied upon in multiple other sectors to help improve performance, lower CO2 emissions and reduce operating costs. Here's an overview of the exciting areas of application beyond the classic bus segment.

Large power trains & industrial engines: efficiency at the push of a button

In industrial applications, a specially developed heating module – made up of Thermo plus, an SPump water pump and an intelligent control system – ensures that large engines reach their optimum operating temperature before they are even started up. The refrigerant circuit is kept at the same stable temperature, even when idle.

The result: significantly lower CO2 emissions, noticeable fuel savings and less wear due to the avoidance of cold starts – which also has a positive impact on the power trains' life cycle costs.

Agriculture: clean work under harshest conditions

Spheros systems are also used in the area of agricultural engineering. The targeted heating of screw conveyors with warm water – achieved with Thermo plus and a controllable SPump – stops mud and dirt from being deposited on the metal blades. The result: greater availability and reliability, even under extreme weather conditions.

Whether for industry, agriculture, construction or alternative drives, the solutions provided by Spheros are flexible, efficient and field-tested.

Construction vehicles: full capacity for liquid bitumen

Every degree counts on construction sites. In some construction vehicles, a combination of Thermo plus heating system and SPump water pump is used to heat a closed water circuit. This in turn keeps a bitumen tank at a consistently optimal working temperature – a vital prerequisite for smooth work processes and high-quality results.

Fuel cell systems: precise thermal management for the future

Spheros is also present in the promising field of fuel cell technology. In the refrigerant circuits fitted here, the CAN bus-controlled water pumps from the SPump family and – if required – the power-adjustable Thermo HV ensure precise temperature management. This enables the aggregates to be operated under ideal conditions, which is key to improving the efficiency and durability of these innovative systems.

Are you considering non-bus solutions? We will be happy to advise you!

Whether for industry, agriculture, construction or alternative propulsion systems, the solutions provided by Spheros are flexible, efficient and field-tested.

Are you interested in receiving further information or would you like to discuss your individual project with us? We look forward to hearing from you! Our team is happy to assist you with their professional expertise and experience.

Spheros around the world: a global network for excellent, local customer support

With 17 development, production and distribution sites across five continents, the Spheros Group is represented around the globe and thus pursues a distinctly customer-centric approach that ensures direct contact with its customers. Over 1,100 employees are hard at work, making sure customer requirements are met not only with innovative products but also with excellent service. Spheros is always present where customers need us. That's what makes our company such a highly reliable partner that understands the specific demands of different markets and provides tailored solutions accordingly.

Innovative solutions from Gilching and Neubrandenburg

Our site in Gilching near Munich functions not only as the company headquarters but also as a global development centre. All major projects for air-conditioning systems, software and electronics run together here. The team in Gilching ensures that all products meet the highest technical and qualitative standards.

Besides a large climatic chamber for conducting in-vehicle testing of overall systems, the development, prototype and testing area in Gilching also features a number of component test facilities. This allows new developments and serial products to be continuously tested in terms of function and reliability, and complex system solutions to be designed for the international market.

The competence centre for heating systems, water pumps and roof hatches is located at the Neubrandenburg site. Neubrandenburg has a long tradition of producing heating systems that goes all the way back to 1956, when the first engine-independent bus heating system was developed there. Today, Spheros produces custom heating systems from the Thermo series for buses and commercial vehicles at eight assembly stations. The choice of products ranges here from diesel or gas heating devices to hybrid and high-voltage technologies. The necessary water pumps are also manufactured in-house. Brushless and magnetically coupled versions as well as PWM and CAN functions offer a broad range of applications.

At the Neubrandenburg plant, all kinds of air-conditioning systems are produced for all sizes of bus and types of drive. The portfolio here also ranges from various performance classes for diesel-powered public buses and coaches over to hybrid and electrically driven vehicles, besides systems for various refrigerants, e.g. R744 (CO_2).

Since 2015, roof hatch development has also been based in Neubrandenburg and certain models are even manufactured here. The plant is the central production site for the entire European market and plays an important role in the company's supply chain.

Competence centres around the globe

In order to ensure customer proximity and service on a global scale, the Spheros Group has consistently pushed forward with its expansion plans. Spheros' global presence is just as impressive as the innovative strength at its sites. With branches and production facilities in Europe, North and South America, Asia, Africa and Australia, Spheros makes sure that every market is catered to with the best solutions. Application and product quality is equally

The Spheros company headquarters in Gilching near Munich.

The competence centre for heating systems, water pumps and roof hatches is found at the Neubrandenburg site.

Spheros around the world: a global network for excellent, local customer support.

high at all sites. Spheros can provide customers in every region with a complete air-conditioning system for every bus size and type of drive, which can also be manufactured in local plants.

Istanbul (Turkey)

A broad range of air-conditioning systems has been produced at the Spheros Termo Sistemleri site since 1994. Spheros Türkiye serves not only local markets but also customers from Eastern Europe and the CIS countries.

Turku (Finland)

Spheros Finland is a leading manufacturer of roof hatches and ventilation systems for buses. Its origins can be traced back to the 1970s when the Parabus brand was founded. The company is the first manufacturer to combine a sunroof with static or motor-driven ventilation in one unit. Today, Spheros Finland exports to 39 countries worldwide.

Noida (India)

Spheros Motherson was set up in 2006 as a joint venture between Spheros and Samvardhana Motherson. Made-to-order air-conditioning systems for all types of buses and drives are produced in Noida. The site provides solutions for the Indian market and neighbouring regions.

Suzhou (China)

In Suzhou, Spheros produces air-conditioning systems for the Chinese and South-East Asian markets as well as the Middle East. The site is one of the leading production facilities for electric air-conditioning units within the Spheros Group.

Elkhart (USA)

In the USA, the company is specialised in air-conditioning systems and roof hatches for school and public buses and special-purpose vehicles for the North American market. Alongside production, the site also offers a number of comprehensive services. On top of this, it operates its own installation workshops in other US cities.

Caxias do Sul and Linhares (Brazil)

The production sites in Caxias do Sul and Linhares (Brazil) cater to customers from all Latin American markets. Besides developing air-conditioning systems, a development and production

Istanbul (Turkey)

Noida (India)

Elkhart (USA)

Caxias do Sul (Brazil)

centre for bus electronics is also based in Caxias for Brazilian customers.

Johannesburg (South Africa)

Spheros' transport refrigeration division is based in Sandton, near Johannesburg in South Africa, and offers a broad range of best-in-class cooling devices for trucks and vans of all sizes. Our solutions are individually tailored to all requirements and draw on our extensive knowledge in the fields of engineering and design.

Ramos Arizpe (Mexico) Melbourne (Australia)

Spheros operates two qualified service and application sites in Ramos Arizpe (Mexico) and Melbourne (Australia). From Melbourne, we provide not only the Australian market but also customers across the whole of New Zealand with bespoke solutions for bus air conditioning and heating.

Global solutions for local markets

What makes Spheros so special is its combination of global expertise and regional proximity. The company's worldwide presence enables it to offer custom solutions that satisfy not only local requirements but also global standards. This balance allows Spheros to develop a broad range of products that is optimized for different markets, climate conditions and technological requirements.

Johannesburg (South Africa)

Suzhou (China)

New Sales-Aftermarket-Service (SAS) manager:

Volker Schuster takes on new role as of 01.10.2024

On 1 October 2024, Volker Schuster (35) assumed management of the Sales-Aftermarket-Service (SAS) division at Spheros. With his many years of experience in sales and distribution and his sound professional training, he is well equipped to advance the division with a view to the future.

Volker Schuster, new Sales-Aftermarket-Service Manager.

After training to become an automotive management assistant with a focus on distribution and service, Volker Schuster went on to study business administration and engineering, specialising in technical sales and distribution. After working as a market analyst in after-sales and as a business manager in the engineering services sector, he moved to Valeo (now Spheros) in October 2017 and assumed the position of Regional Sales Manager Europa. In his new role, he is looking to really drive things forward:
"After seven exciting years in Sales and Distribution, I am very much looking forward to my new responsibilities in the Sales-Aftermarket-Service (SAS) division. Together with my team, I want to continue strengthening communication with our customers and partners, orient our solutions to the requirements of new technologies such as electromobility and the use of natural refrigerants, and see to the targeted development of our partner network in Europe."

Volker Schuster's former role – Regional Sales Manager Europa – is now open to applications. Thomas Schuster and Katrin Panas are available as points of contact here until the position is filled.

Spheros training academy Train the trainer – next level

The technological transformation in the world of buses also has a significant impact on the service and maintenance requirements of HVAC (heating, ventilation, air conditioning) systems in buses. The technology used in modern air-conditioning units is becoming increasingly innovative but, in part, also more complex. Technicians have to be able to fully comprehend these novel systems if they are expected to be able to carry out targeted maintenance and service tasks. This requires continuous and comprehensive training and specialist expertise.

F.l.t.r.: Boris Aleksandrov (Auto Market Bus), Thomas Schuster (Spheros), Thomas Koutroutsis (Elecar), Volker Schuster (Spheros), Sune Elkjær (Christonik) and Christian Rud Ingvardsen (Christonik).

The Spheros training academy makes sure customers and service partners are always up to speed with the latest Spheros products – through training held either online, on the plant floor, at manufacturing facilities or directly at the customer's workplace. In order to take quality and expertise in the European markets to the next level, the Train the Trainer programme was launched for Spheros premium partners. This programme not only gives these partners an in-depth understanding of the functions and modes of action of Spheros products, it also instructs them on the measures required for effective maintenance and repairs. Armed with this knowledge, the partners can then hold their own training courses for repair shops as authorised Spheros trainers.

Besides conducting training, premium partners have a number of other important tasks: they support customers in their respective markets, guarantee first-class service, see to maintenance and warranty matters, provide replacement parts and are responsible for all marketing activities.

The Train the Trainer programme ensures an extensive and reliable supply of Spheros products and replacement parts in all European markets. All kinds of public buses can depend on professional, local care and competent points of contact for any needs or queries pertaining to the Spheros products.

View of the electrical components on the roof of an electric articulated bus.

Electric bus funding after federal funds pulled – opportunities through state programmes

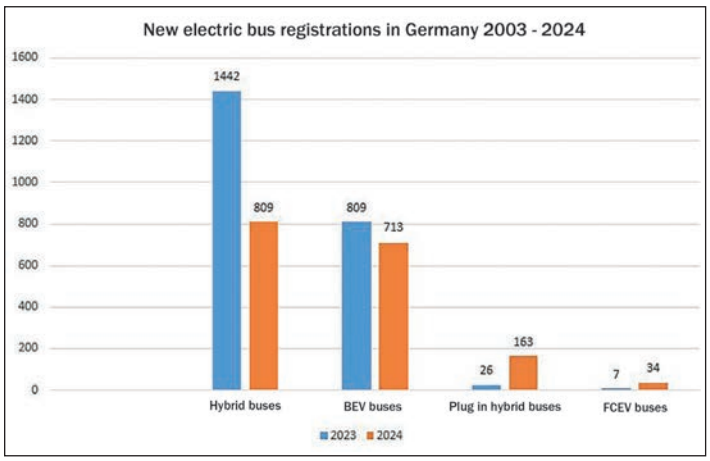
German federal funding has been suspended for commercial public transport vehicles powered by alternative propulsion systems, leaving many transport companies facing new challenges. The funds, which had been provided by the federal government, had made a significant contribution to the market launch of electric buses. Its discontinuation is now forcing many players in the industry to reappraise existing strategies concerning the electrification of their fleets.

Yet there are also glimmers of hope: several federal states offer their own funding programmes in order to continue supporting the transition to emission-free propulsion systems. These state funds, however, differ hugely in structure and scope – it is therefore essential that the respective guidelines are reviewed in detail.

Take North Rhine-Westphalia, for example: here, financial support is available for battery electric buses, hydrogen-powered vehicles (fuel cells) and buses powered by overhead lines. Funding covers up to 60 percent of additional investment costs when compared with a conventional Euro-VI diesel bus. Besides the procurement of the vehicles themselves, the necessary charging or refuelling infrastructure as well as special workshop equipment are also subsidised – the maintenance of high-voltage components, for instance. In these areas, up to 90 percent of eligible expenses can be subsidised.

One key requirement for eligibility is that the vehicles and related infrastructure must be used exclusively for local public transport.

Despite the discontinuation of Germany-wide funding, the switch to emission-free propulsion systems remains a central objective. State grants can really make a difference here, provided transport companies actively take advantage of the opportunities available.



A decline in hybrid and BEV buses was recorded from 2023 to 2024. Plug-in hybrid and fuel cell electric buses, by contrast, saw a slight increase in 2024.

Source: www.emcel.com/de/zugelassene-e-busse-2024, based on data provided by the German Federal Motor Transport Authority

The Spheros production facility in Istanbul.

The Spheros Turkey plant expands production

The Spheros plant in Turkey was founded in 1995 in Esenyurt, Istanbul, and has since established itself as a significant production site. The plant makes and distributes a variety of products. Numerous measures aimed at boosting the efficiency and capacity of the plant have been introduced in order to accommodate increasing customer demand. These include, among other things, the introduction of an additional production line.

With 97 members of staff, the plant belongs to one of the strongest mainstays within the Spheros network in terms of the sales and production capacity of air-conditioning systems and other vehicle components. A special feature of this particular site is the manufacture of copper pipes, some of which are also used in the production of air-conditioners in Neubrandenburg.

The biggest customers at present are the MAN and Mercedes-Benz factories in Turkey, which underscores the company's strong market position in the region.

Besides the REVO (Spheros' latest generation of air-conditioning systems for coaches), TOP 2000 HVAC systems (roof-mounted air-conditioning system for coaches) and the Minisphere (roof-mounted air-conditioning system for minibuses) are also manufactured here. Moreover, side-wall heaters, heaters for driver sleeper cabs and air-conditioners for driver workplaces all form part of the plant's product portfolio.

In November 2023, production of the REVO air-conditioning systems was relocated in part from the Spheros plant in Neubrandenburg to Istanbul. This expansion in production highlights the continuous growth of the plant and its ability to adapt to new requirements.

Since 2022, production capacity (52% rise in production) has gradually expanded. This was bolstered by a number of preparatory measures in 2023 aimed at boosting the efficiency and capacity of the plant in line with respective requirements.

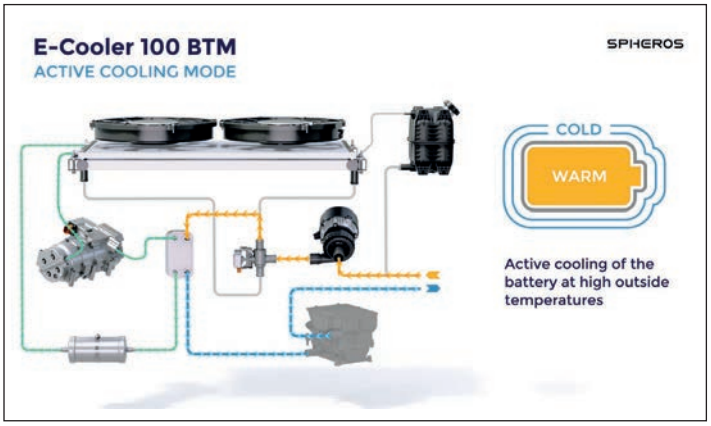
In order to meet increasing demand and continue improving production efficiency, an additional production line was integrated and brought into service at the start of 2025. Both lines can now be used according to demand and offer maximum flexibility. As part of these optimizations, storage capacity was also increased by an impressive 30% through the implementation of advanced warehouse systems and process optimizations.

Moreover, staff training was provided in parallel with all of the optimization measures. Here, Spheros Turkey relies on a strong combination of occupational health and safety, quality and efficiency. With a mix of experienced employees and young talent, the plant is best positioned to continue expanding its market share in Turkey while gaining a foothold in new markets.

Efficient thermal management for electric bus batteries – why the right temperature is key

Electric buses are seen as a central solution for sustainable, emission-free mobility. Their reliable operation depends on powerful, high-voltage battery systems that are integrated into either the vehicle roof or the vehicle floor. These batteries generate a lot of heat when in operation and, in particular, during periods of rapid charging. In order to safeguard their viability in the long term, a precise and efficient approach to battery thermal management (BTM) is required.

E-Cooler 100 BTM from Spheros



Active cooling mode: the air-conditioning circuit cools the refrigerant. The refrigerant circuit releases the heat from the batteries through the plate heat exchanger.

The central role of battery thermal management

Effective BTM ensures that the batteries are always operated within their optimal temperature window. This has a significant impact on a vehicle's safety, efficiency and lifetime.

Safety: Regulated thermal management prevents the cells from overheating and reduces the risk of thermal runaway, which can lead to an uncontrolled rise in temperature and ultimately destroy the system.

Performance: Consistent operating temperatures make for a stable operating range – even when faced with changing outdoor temperatures, i.e. over the course of the seasons.

Durability: A battery system that operates at the optimal temperature is subject to only a low loss of capacity, which significantly lengthens the lifetime of the battery cells.

Challenges facing the operation of scheduled services

Daily operation in the local public transport network places high demands on thermal management systems.

Climatic influences

Electric buses are used in extremely diverse climate zones. In cold regions, the battery has to be actively heated, while powerful cooling is needed in hot regions so as to avoid thermal stress.

Continual operation

Electric buses used within the public transport network are often in operation for many hours at a time with very few breaks except for brief periods of standing time and frequent quick charges. The BTM system has to be able to function effectively during the entire operating period, regardless of driving or charging processes.

Energy efficiency

Every thermal management system consumes energy itself. To avoid impeding the vehicle's range, the system design has to be as efficient as possible, providing maximum cooling and heating but using only a minimal amount of energy.

The solution: E-Cooler 100 BTM from Spheros

With the E-Cooler 100 BTM, Spheros offers a solution that has been specially developed to meet the operational requirements of electric buses. The system brings together powerful cooling and heating functions in one compact, robust design:

- 10 kW of active and passive cooling capacity
- 12 kW of integrated heating capacity
- Operation in all climate zones, even in extreme conditions
- Compact design and high energy efficiency

The E-Cooler 100 BTM is therefore optimally adjusted to the needs of city and regional buses while also offering a reliable solution for other applications with similar drive technologies – electrically operated trucks, construction vehicles or special-purpose vehicles, for example.

Conclusion

Powerful and energy-efficient battery thermal management is essential to the economical and safe operation of electric buses. It protects the battery from thermal stress, maintains range and increases the cells' lifetime.

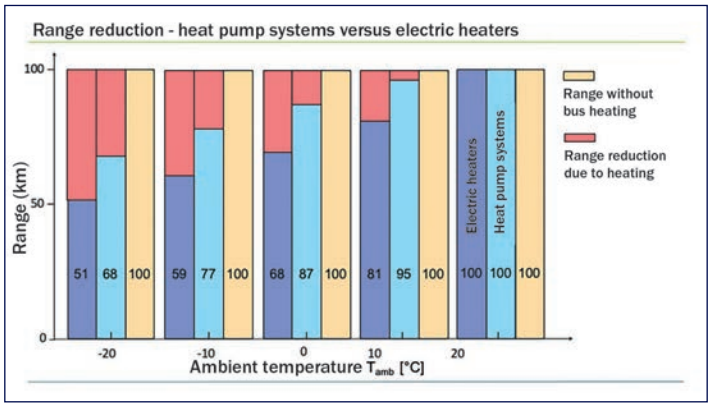
The E-Cooler 100 BTM from Spheros presents a practice-oriented, modular solution, which can be flexibly adapted to different vehicle concepts and climate conditions – for maximum operational reliability and cost efficiency in day-to-day life.

You can find a detailed product video about the E-Cooler 100 BTM on the Spheros YouTube channel.

Heating electric buses – challenges and solutions for winter operation

As the electrification of local public transport services continues to advance, attention is also turning to the issue of heating electric buses. While the waste engine heat from conventional diesel-powered buses provides a natural source of heat for cab heating, electric buses require alternative solutions for interior heating. This is particularly challenging given that the use of additional heating systems can have a considerable influence on the range and energy-efficiency of electric buses.

During the colder months, heating electric buses not only strains the vehicle's battery, it also reduces range, as a significant part of the energy from the battery is consumed for heating. This is a particular challenge in cold regions and on long routes. Despite this, Spheros is continuing to see customer demand for electric buses with additional heating.



Comparison: range reduction when heating with an electric heater versus a heat pump.

The most commonly used heating systems in electric buses are high-voltage heaters and heat pumps. Both systems require energy from the vehicle battery to generate heat. While these systems are reliable, they consume a significant amount of energy if electric heaters are used. In comparison, heat pumps are by far the more efficient of the two. In both cases, however, the range of electric buses is reduced in cold ambient temperatures.

Heating systems operated by sustainable fuels such as HVO or RME present an innovative alternative. These systems support an environmentally-friendly approach and little strain is placed on the vehicle battery. One example of this type of system is the Spheros Thermo plus heater, which can be operated with alternative fuels such as biodiesel or vegetable oils. These heating systems generate heat without placing any significant amount of strain on the vehicle battery, as they are operated using a combustion process with a separate fuel tank. As a result, this is not connected to the vehicle battery, meaning the demand for heating does not reduce the range of the buses. What's more, the use of sustainable fuels contributes to the continued reduction of carbon emissions, further supporting the "zero emission" strategy of electric buses. Spheros installs the Thermo plus heaters in its series production line, but also offers retrofit solutions for existing vehicles.

Use of HVO/XTL fuels and initial practical experience with Spheros heaters

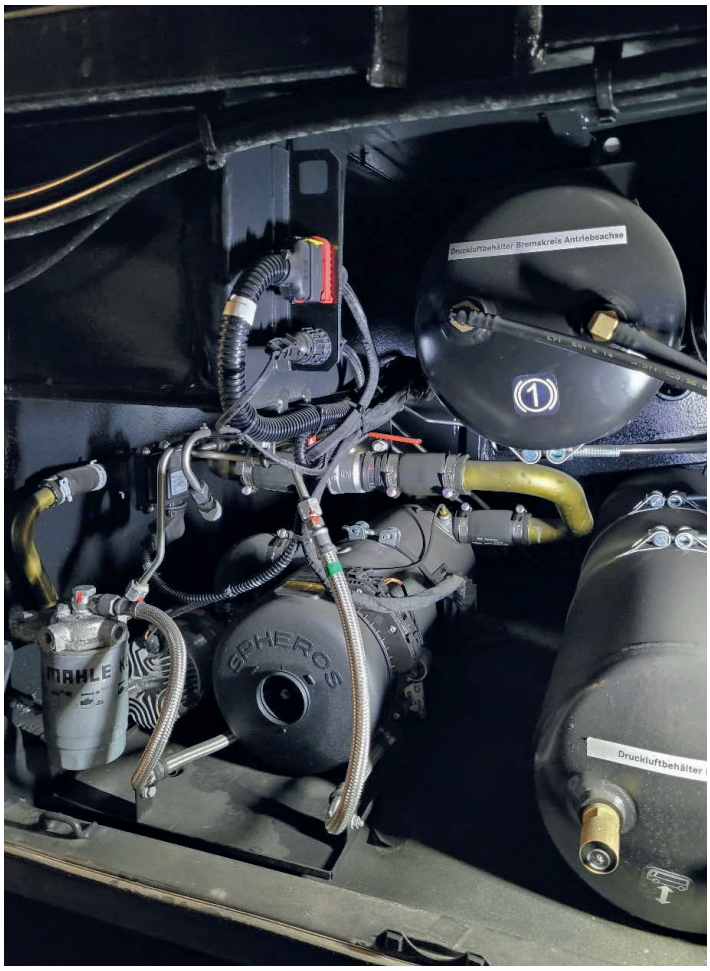
Since 10 April 2024, an amendment to the 10th Federal Immission Control Ordinance in Germany has permitted the use of HVO (hydrotreated vegetable oil) fuel in transport. HVO, also known as XTL ("X-to-liquid") encompasses various synthetically produced fuels. The "X" stands for any raw material that is liquefied and converted into a usable fuel, while "TL" stands for the liquefaction process. The standard for XTL fuels is DIN EN 15940.

HVO is characterised by its much cleaner combustion compared to conventional diesel and produces fewer local emissions. This is another reason why the fuel is becoming increasingly popular, also in local public transport. New vehicles operated with HVO are classified as "clean vehicles" under Germany's Clean Vehicles Procurement Act.

Not only vehicle engines, but also the heating systems produced by Spheros are already operated with HVO100. Spheros has published comprehensive technical information (TI) on this topic, which is available on the download page of the Spheros website and can easily be found by entering "DOK70104-003" in the search field.

Pioneering transport companies have been using HVO100 from various suppliers in their Spheros heaters since May 2024. Spheros has monitored this use from the very beginning and conducted initial analyses after nine months of operation. The investigations showed that the interior of the burner head in particular remains virtually free of deposits and that the overall heater operation is cleaner.

The results after initial practical experiences with HVO100 in Spheros heaters are extremely positive. The fuel performance is outstanding and it has no negative impact on the functionality of the heating systems.



Installation situation of the Thermo plus 300 CAN in the Citaro LE B2E, 2024 model.

Opened burner head of a Thermo plus 300 CAN after an operating time of 9 months with HVO100 – free of deposits.

The moBiel GmbH hydrogen bus with Spheros air-conditioning.

Emission-free transport – moBiel relies on hydrogen buses and Spheros climate comfort

The transport company moBiel GmbH in Bielefeld is resolutely advancing climate-friendly local transport in the region. Through the staged expansion of its emission-free bus fleet, the company is helping to protect the climate as well as supporting innovative technologies and strong partnerships, including its relationship with long-standing climate system partner Spheros.

Besides Euro VI vehicles, moBiel's modern fleet now includes 29 emission-free buses. Four solo fuel cell buses from the manufacturer Caetano were purchased back in 2021 as part of the first tender under the Clean Vehicles Directive (CVD). In 2023 this was followed by another large tender awarded to Daimler Truck & Bus with the eCitaro Fuel Cell model. The order included a total of 25 vehicles, comprising eight 12-metre solo buses and seventeen 18-metre articulated buses. This new vehicle generation combines electromobility with hydrogen technology. A powerful battery with a capacity of around 400kWh and a fuel cell as a range extender (up to 30kg of hydrogen) make the buses emission-free as well as extremely flexible to operate.

A comfortable onboard climate is ensured by the tried-and-tested Spheros technology. The company has been reliably supplying innovative HVAC systems (heating, ventilation and air conditioning) to moBiel for many years. The new hydrogen buses use the modern "REVO® HP" air-conditioning system with Spheros heat pump technology in both the front and rear section of the vehicles. The system ensures

View of the bus roof with the Spheros REVO® HP air conditioning system with heat pump technology.

energy-efficient and uniform air conditioning for the driver and passenger compartment, even in extreme weather conditions. What's more, the vehicles are fitted with the latest SPump 500 CAN water pumps as well as the Thermo plus auxiliary heater, which ensure the reliable supply of heat at low ambient temperatures.

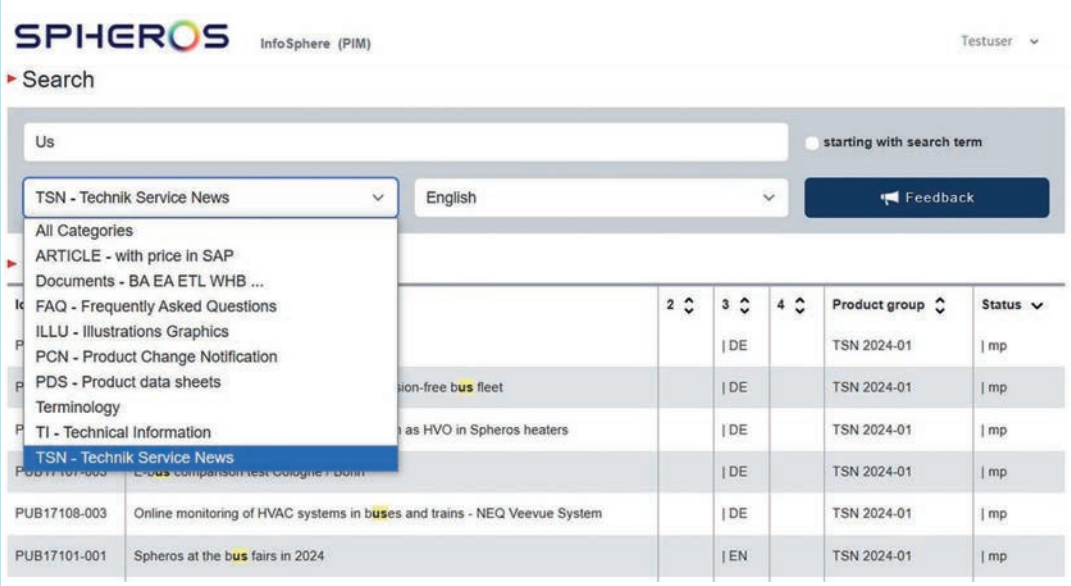
With this combination of innovative drive technologies and modern thermal management, moBiel once again shows what the future of local public transport can look like – efficient, comfortable and emission-free. The close partnership with Spheros is an important element on the path towards more sustainable mobility.

moBiel

Transport company **moBiel GmbH** based in Bielefeld, North Rhine-Westphalia, is an important provider of local public transport in the region. The company currently operates a total of 132 buses on 80 routes. In 2023 moBiel transported around 57.8 million passengers and covered approximately 16.8 million kilometres. moBiel GmbH currently has three depots, the highlight of these being the depot in Sennestadt, which was built in 2018 and equipped with the latest workshop technology, including roof working platforms as well as charging infrastructure with 25 180kW charging points. The depot in Bielefeld-Heepen, in operation since 2021, is currently being expanded to accommodate the future fleet of 29 hydrogen buses.

New developments from PIM Parts Information Management

The utility value of our established Parts Information Management has grown in many areas over the past few years, with customers now able to access a huge amount of additional information on one platform. The new name InfoSphere was chosen to reflect and underscore this additional value.



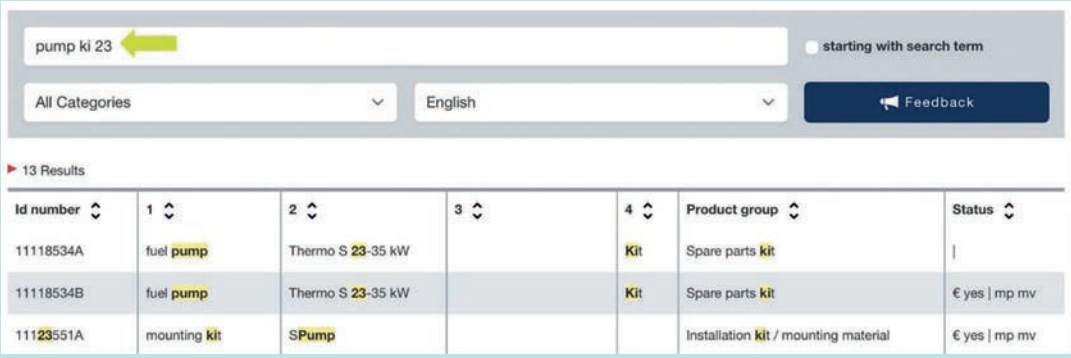
New highlights from the InfoSphere

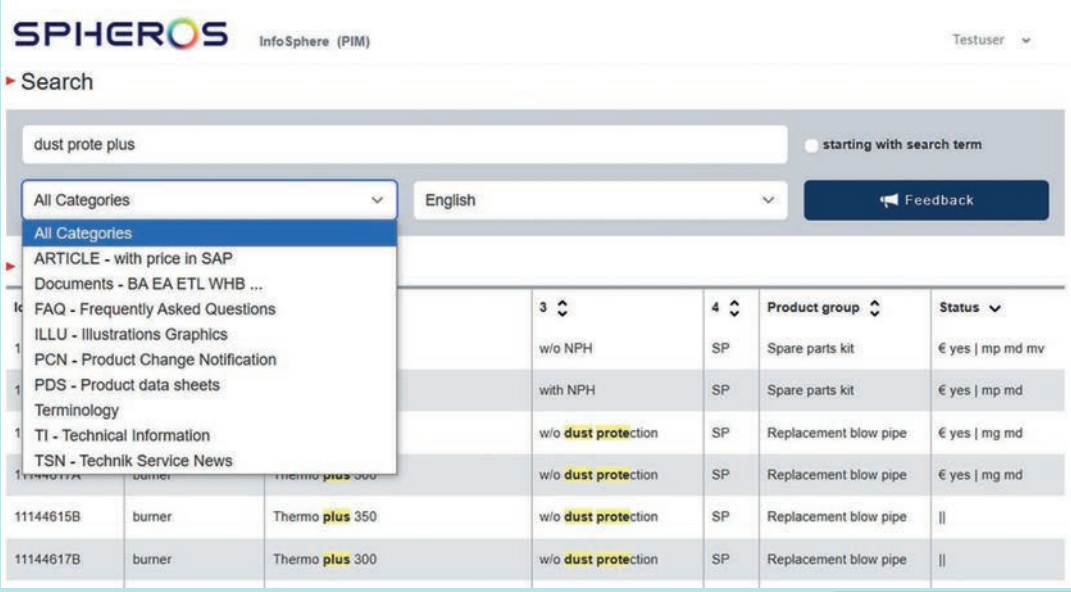
The search function has been hugely improved. New features now allow a targeted, detailed search using multiple keywords.

Enter your search terms into the text box.

→ You can enter several search terms.
→ The order of the search terms is not important.
→ The system also recognises spaces.

→ For terms that belong together such as “Thermo G”, use an underscore “_” rather than a space. Your search term would then be “Thermo_G”.
→ When searching for an article, always omit the index. Instead of 1111834A, for example, you would only type in 1111834.





Tip

Don't enter the entire word to begin with.
You can quickly check the search results and then narrow them down by:
a) adding additional letters and
b) selecting the target category.

Please note: "All Categories"

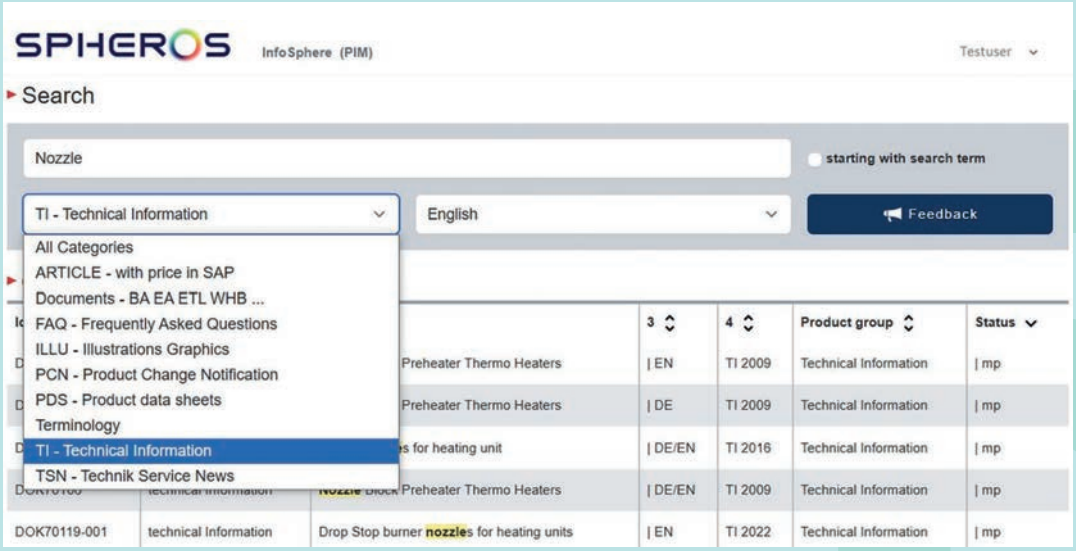
→ Every selected category narrows down the search results
→ Select "All Categories" if you want to see all available hits.

TSN - Technik Service News

The issues of our Technik Service News customer magazine are now freely accessible and available to download as individual articles or as an entire edition. This allows you to find all articles on an array of topics such as HVO, refrigerants, Spheros products, voices from the market and much more.

TI - technical information

TI documents concerning Spheros products such as fuel-injection nozzles or pumps are now accessible and available for download.



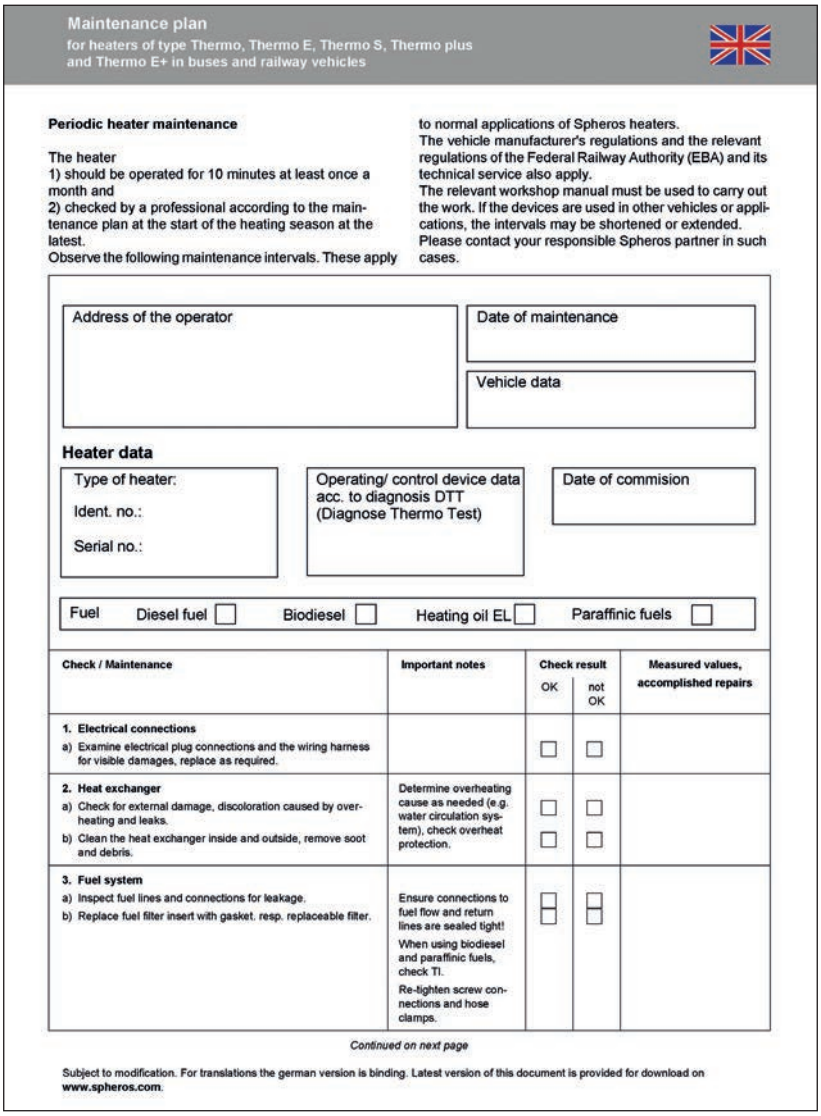
Maintenance kit for Thermo plus

The regular maintenance of Spheros heating devices is both essential and obligatory. Heating that functions properly not only improves comfort but also helps avoid breakdowns and unnecessary repair costs.

Regular inspections and maintenance measures make sure that heating systems are working efficiently while also retaining a comfortable temperature in the vehicle. As a result, the respective buses can be relied on throughout their entire service life and passengers can always enjoy a comfortable environment. To support and facilitate these measures, Spheros provides clearly defined maintenance kits for its Thermo heaters from the Thermo S series and now, as of 2025, for Thermo plus. They are based on the official service and maintenance plans, which can be found on the Spheros website at **www.spheros.com.**

Set by performance class, the kits enable workshops to stock parts in good time, regardless of vehicle type.

You can find all service-related documents in the download centre on our website by entering the reference **9008722E–003** in the search box.



Maintenance plan

for heaters of type Thermo, Thermo E, Thermo S, Thermo plus and Thermo E+ in buses and railway vehicles

Periodic heater maintenance

The heater
1) should be operated for 10 minutes at least once a month and
2) checked by a professional according to the maintenance plan at the start of the heating season at the latest.
Observe the following maintenance intervals. These apply to normal applications of Spheros heaters.
The vehicle manufacturer's regulations and the relevant regulations of the Federal Railway Authority (EBA) and its technical service also apply.
The relevant workshop manual must be used to carry out the work. If the devices are used in other vehicles or applications, the intervals may be shortened or extended.
Please contact your responsible Spheros partner in such cases.

Address of the operator

Date of maintenance

Vehicle data

Heater data

Type of heater:
Ident. no.:
Serial no.:

Operating/ control device data acc. to diagnosis DTT (Diagnose Thermo Test)

Date of commision

Fuel Diesel fuel ☐ Biodiesel ☐ Heating oil EL ☐ Paraffinic fuels ☐

Check / Maintenance	Important notes	Check result OK	Check result not OK	Measured values, accomplished repairs
1. Electrical connections a) Examine electrical plug connections and the wiring harness for visible damages, replace as required.		☐	☐	
2. Heat exchanger a) Check for external damage, discoloration caused by overheating and leaks. b) Clean the heat exchanger inside and outside, remove soot and debris.	Determine overheating cause as needed (e.g. water circulation system), check overheat protection.	☐ ☐	☐ ☐	
3. Fuel system a) Inspect fuel lines and connections for leakage. b) Replace fuel filter insert with gasket, resp. replaceable filter.	Ensure connections to fuel flow and return lines are sealed tight! When using biodiesel and paraffinic fuels, check TI. Re-tighten screw connections and hose clamps.	☐ ☐	☐ ☐	

Continued on next page

Subject to modification. For translations the german version is binding. Latest version of this document is provided for download on **www.spheros.com**.

Id number	1	2	3	4	Product group
11150251A	Wartungskit	Thermo plus 35 kW	klein	Kaltland	ET-Kit
11150252A	Wartungskit	Thermo plus 30 kW	klein	Kaltland	ET-Kit
11150253A	Wartungskit	Thermo plus 23 kW	klein	Kaltland	ET-Kit
11150254A	Wartungskit	Thermo plus 16 kW	klein	Kaltland	ET-Kit
11150255A	Wartungskit	Thermo plus 16 kW	groß	Kaltland	ET-Kit
11150256A	Wartungskit	Thermo plus 23 kW	groß	Kaltland	ET-Kit
11150257A	Wartungskit	Thermo plus 30 kW	groß	Kaltland	ET-Kit
11150258A	Wartungskit	Thermo plus 16 kW	groß		ET-Kit
11150259A	Wartungskit	Thermo plus 23 kW	groß		ET-Kit
11150260A	Wartungskit	Thermo plus 30 kW	groß		ET-Kit
11150261A	Wartungskit	Thermo plus 35 kW	groß		ET-Kit

FAQs

The Frequently Asked Questions (FAQs) section is now a fixed part of Technik Service News and answers questions commonly put to the Service division.

What is the correct way to evacuate a refrigerant circuit?

When the refrigerant circuit of an air-conditioning system is opened, moisture from the ambient air enters the pipelines and components. This moisture needs to be removed before the system can be filled with refrigerant.

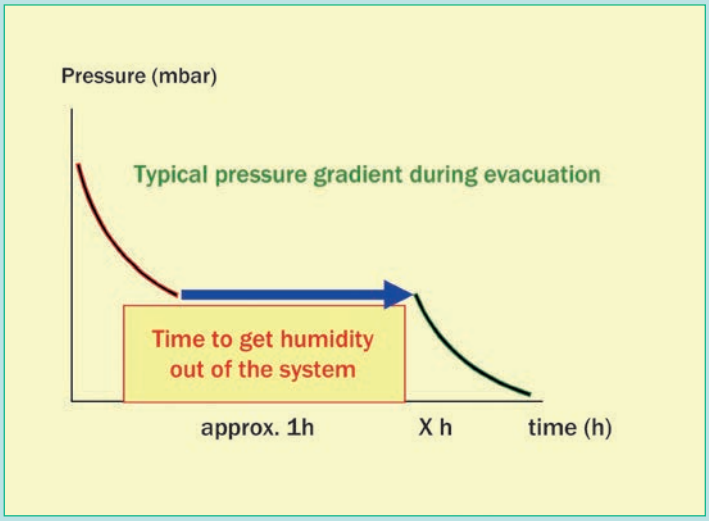
The refrigerant circuit is dried by evacuation. This lowers the pressure in the closed circuit to a level that allows any moisture to evaporate before being extracted.

The vapour pressure of water depends on the temperature. The lower the ambient temperature, the lower the pressure required to evaporate the moisture.

If the required pressure is not reached during evacuation or the process is stopped too soon, residual moisture will remain in the system. This can react with the refrigerant oil and form acids that damage components.

Correct evacuation

To reliably measure the pressure, a suitable pressure gauge needs to be connected to a point in the circuit as far away from the vacuum pump connection as possible. Spheros climate systems provide appropriate connections on the refrigerant pipes for this purpose.



After starting the vacuum pump, the pressure initially drops rapidly. The pressure gauge then shows the vapour pressure according to the ambient temperature, for example 23.4 mbar at 20°C. As long as the indicator remains at this value, moisture is still being evaporated and extracted.

The absence of moisture is only ensured when the indicator drops further. The final vacuum should be between 7 and 10 mbar. The evacuation process can only be finished after this value has been reached.

What has changed on the brackets of the heat exchangers?

On the heat exchangers, the weld nuts on the brackets have been replaced by insert nuts. The assembly process and screw position remain the same. The new torque for securing the heat exchangers with weld nuts is: 15 + 5 Nm.

What does the flame detector on the new SG1572D for the Thermo heater look like?

In the new control unit for the Thermo heater, the flame detector has been integrated into the control unit, as is now the case for all Spheros diesel heaters. For more information, see TI document DOK70131 available at www.spheros.com.

What is the difference between flame sensors 86523B and 11122598A for the GBW heater?

Flame sensor 86523B can only be used for GBW heaters/vehicles that were produced and registered before 11/2015!

GBW heaters/vehicles with a production or initial registration date after 11/2015 must use flame sensor 11122598A.

Flame sensor 11122598A is 100 % backwards compatible and can be used in all GBW heaters. The sensor satisfies standard R118 “Burning behaviour of interior materials”.

High-tech for maximum precision

New pipe bending machine installed in the Neubrandenburg plant

In April 2025 an important investment at the Neubrandenburg site entered its final phase: the installation of a new fully-automatic multi-level bending machine. With the installation of this cutting-edge machine, Spheros marks a further milestone in automation and increased efficiency in aluminium pipe production.

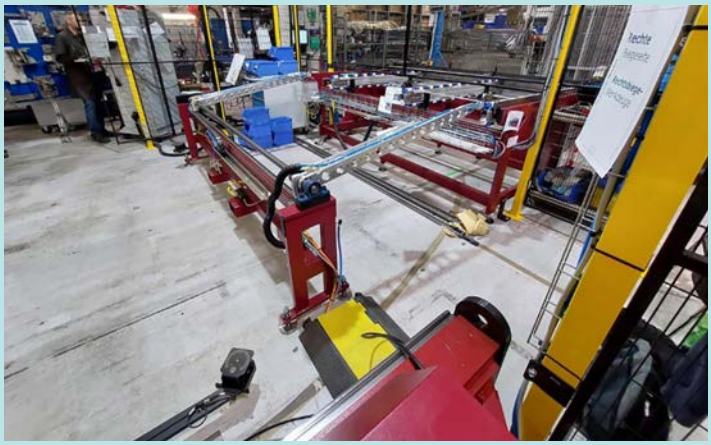
As a developer and manufacturer of bus air-conditioning systems, Spheros constantly relies on aluminium and stainless steel. As a result, we have maintained in-house, high-quality machinery for processing aluminium and stainless steel pipes at the Neubrandenburg plant for many years. The cleverly designed pipe runs as well as the joining and connection possibilities open up a wide range of technically demanding applications. The manufactured pipes are predominantly used in Spheros system solutions and products.

The new pipe bending plant (MBVA 32 SM 14 R/L) provides additional flexibility and precision: it machines pipe lengths from 106 to 2,500 mm as well as diameters ranging from 6 to 38 mm – perfectly matched to the varied requirements in vehicle air conditioning. A particular highlight is the integrated automatic material feed. This enables even high quantities of complex pipe geometries to be efficiently manufactured with exceptional repeatability. The MBVA 32 SM 14 R/L operates as a fully-automatic manufacturing cell.

The manufacturing of the first sample pipes for series release has already started. The machine opens up a new chapter in terms of productivity and quality in our Neubrandenburg plant – all of which benefits our customers worldwide.

Material feed table with removal loading arms.

Preliminary acceptance as a unit at the manufacturer's site.



Installation in Neubrandenburg, preparation for the start of series production.