



The future lies in service
Spheros further expands its technical service support

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Quality at Spheros...
... is a decisive factor for customer satisfaction

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Fresh air filters must be fresh
Protection of the air conditioning system against dirt and deposits

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Spheros REVO-E on the Volvo Hybrid in series





Dear Reader,

A successful 2014 now lies behind us. In terms of turnover, the year closed with very good results, and 2014 has also seen the achievement of a number of successes with our products. With the change-over to the Euro 6 generation, Spheros launched new products onto the market. From 2014 onwards, for example, all Volvo Hybrid vehicles will be equipped with the all-electric REVO-E air conditioning system. The Citysphere urban bus air conditioning system was successfully introduced as standard equipment on the Citaro, and the integrated Aquasphere II air conditioning system celebrated its première in the Setra Top Class range.

A further highlight of 2014 was the IAA Commercial Vehicles fair in Hanover. With a brand new trade fair concept, Spheros demonstrated that a strong appearance is possible without showcasing any products. The world of politics and the trade press acknowledged our work, and Spheros won two awards in 2014: "busplaner" magazine's Innovation Prize for the all-electric, REVO-E air conditioning system, and the EBUS Award (environmental prize for buses in public transport).

Please read on to find out more about the above topics, along with further interesting information on the company and its products. I would like to thank all those who use our products on a daily basis, as well as those who maintain, repair and install them, for the trust they have placed in Spheros. It goes without saying that we will continue to focus on the enhancement of our products and services in 2015.

On this note, I wish you happy reading and extend my best wishes for a successful 2015!

I hope you enjoy this newsletter!

Rainer Kolodzie

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LEGAL NOTICE / CONTACT

Publisher:
Spheros Europa GmbH
Friedrichshafener Straße 9-11
82205 Gilching

Visitor address:
Lilienthalstraße 2a
82205 Gilching

Editor:
Fabienne Ehmann
Tel.: +49 (0) 8105 7721-828
fabienne.ehmann@spheros.de

Retrofit at VHH

In 2013, VHH AG (Verkehrsbetriebe Hamburg Holstein AG) public transport authority decided to equip all of its new Euro 6 vehicles with the electrically powered Citysphere urban bus air conditioning systems, rather than the Aerosphere full air conditioning systems. About 350 Citysphere systems are now in daily operation on the roads in the greater Hamburg region. The key reasons for this change were greatly reduced maintenance costs and lower additional fuel consumption in the cooling mode.

The concept of the simple, maintenance-free Citysphere system is convincing: the only maintenance work required is the change of air filter, which can be carried out without opening the refrigeration circuit. This results in an appreciable reduction in the workload and working time for workshop personnel. "We made a conscious decision to use the Citysphere. These systems are operating flawlessly in almost 100 of our vehicles and have satisfied our expectations as regards performance. Their maintenance costs are also substantially lower than those of previously installed systems," explains Marco Meier (VHH Workshop Manager). "Due to the reduced use of refrigerant they save resources and are kind to the environment."

In terms of environmental protection and waste disposal, Citysphere air conditioning systems have proven very appealing to operators and municipalities alike. The hermetically sealed refrigeration circuit prevents the loss of refrigerant that is partly inherent to the system. This saves costs and protects the environment – without compromising on cooling performance, air circulation or comfort. Neither the passengers nor the bus drivers have perceived any change in temperature behaviour in the passenger compartment compared to full air conditioning systems.

For further information on VHH please visit:
<http://vhhbus.de>



Citaro C2 Euro 6 articulated bus with four Citysphere Comfort systems (with heating section) and a Citysphere S in the driver's space.

"Maintenance costs are substantially lower than those of previously installed systems. Due to the reduced use of refrigerant they save resources and are kind to the environment."

Marco Meier (VHH Garage Manager)



Interior of the Citaro C2 Euro 6 with Spheros Citysphere air conditioning.

Spheros REVO-E on Volvo Hybrid in series

Since early 2014 all air-conditioned, single-decker low-floor vehicles in the Volvo range of buses – the Volvo 7900 Hybrid Euro 6 and the Volvo 7900 Hybrid articulated bus Euro 6 – have been supplied to European markets with Spheros' all-electric REVO-E rooftop air conditioning. The Volvo 7900 Hybrid is the second hybrid bus model to be series-manufactured by Volvo.

The first vehicles have been delivered to transport operator Hamburg Hochbahn, the cities of Madrid in Spain and Drammen in Norway, and the Lothian Region in Scotland.

The roof-mounted air conditioning system is suitable for hybrid, electric and trolley buses. The main benefits of the system include controllability, intelligent incorporation of all electric components and compact design. The refrigerant compressor is integrated into the roof-mounted system via a patented vibration isolation unit, and it is electrically powered, guaranteeing a constantly high cooling performance, even when the combustion engine in the bus is not operating according to hybrid technology. The drive system, which is independent of the combustion engine, is used to increase the overall efficiency of the REVO-E through appropriate control of the electric components. The compressor speed can thus be adapted to climatic conditions. The evaporator fans also adjust according to the required air volume and the condensation fans are permanently set to the optimum level on a continuously variable basis.

Moreover, hybrid buses achieve fuel savings of up to 39% with the REVO-E and a 40 to 50% reduction in harmful emissions.

The air-conditioned vehicles have been received well on the market, as demonstrated by the number of systems manufactured to date and

the high number of orders forecast for the coming months. The product launch has been very positive, attributable among other things to the exceptional project work by Spheros engineers and the high level of manufacturing expertise at the Spheros production plant in Neubrandenburg.

“For us, this project means a decisive step towards electric mobility. We are proud to have forged this path with Volvo, and on this basis we will continue to support the manufacturers with a range of intelligent solutions,” says Markus Hummel (Spheros Key Account Manager).



The Volvo 7900 Hybrid with Spheros REVO-E.



The fully automatic roof-mounted REVO-E stands out due to its intelligent energy management and special incorporation of the compressor.



The future lies in service

Spheros continues to invest in customer service, and is further extending its technical service support and market coverage. This has resulted in some innovations:

At the national level, the wide network of sales partners – highly valued by customers – has been supplemented by two additional modules: Service Partners and Service Mobiles. This configuration enables us to offer the right product and ideal technical support, as well as the installation and servicing of components and systems in the vehicle.

Across Europe, the Spheros sales network has been reinforced by four new partners, ensuring greater customer proximity at the international level. On this basis, partner CHRISTONIK with its team in Denmark and Service Mobile offers all-round customer services to operators and fleets.

In Belgium, partner Autoelectro Andries b.v.b.a was chosen to support Spheros Service on site. It can also perform technical servicing (air conditioning and heating maintenance as well as retrofitting) on the vehicles in its own workshop.

In Switzerland we have been joined by the 50-year-old family-owned Oskar Fäh AG. And in Italy, with its

new partner Amadio, Spheros can now draw on the know-how of a genuine expert in the bus industry. Amadio has a company history that goes back 50 years and is a highly regarded partner to several Italian bus operators.

All sales partners have brought along in-depth knowledge and many years of experience in the

bus sector. This means we can offer our customers an optimum level of service right from the outset.

But even the most experienced sales and service partners need regular training to familiarise themselves with the entire Spheros product range and its applications. For this reason, we offer qualified product training sessions to our end customers and service part-

ners, and supervise the training of a new generation of employees. In addition to this, individual training centres are being established in Gilching and Neubrandenburg.

Only within such a network of best-trained national and international sales and service partners is Spheros able to offer the customer all-round service.



Training session on heating- and pump systems at the premises of new sales partner Amadio in Italy.

Quality at Spheros

The term 'quality' can be interpreted in several ways. Two of these are especially important: product benefit and flawlessness. Key attributes such as performance, range of functions and low power consumption are of crucial importance for ensuring customer satisfaction, and also have a positive influence on our competitive edge.



Arrangement of pumps on an endurance test stand.

The term quality also encompasses the number of breakdowns in the field, reworking during production, and design modifications during series production. These can yield grievances and complaints, resulting in the need for refinishing and much more. Spheros counters these with a range of measures.

At Spheros, working to ensure customer satisfaction starts long before our products are put to the test in the field and describes a steady sequence of quality assurance measures. In the initial phase of a project, the interdisciplinary project team defines the ways in which the requirements set out in the specifications can be realised in the product.

In our testing facilities the prototypes are initially subjected to function-oriented performance tests. Once the data has been con-

firmed, endurance tests are carried out under climatic (e.g. dry heat) and mechanical (e.g. vibration and shock test) conditions.

The testing of a range of prototype stages (from evaluation models to first samples manufactured under

near-series conditions) also includes supplier development.

Our many years' experience in the field of air conditioning mean that we can draw on trusted partnerships. The development of new components is then based on

tried-and-tested concepts. To ensure our competitive edge, when dealing with new technologies we base our work on close coordination of joint development tasks.

Process audits at the supplier's premises and Spheros production sites round off the package of measures. These open the way to the production of components and systems.

It is important to maintain contact with the OEM and bus operators throughout the field evaluation phase, as this ensures fast feedback resulting to potential problems. Planned re-qualification tests are completed on a proactive basis. If these can also be completed without anomalies, customer satisfaction can generally be assured.



Thermo E heaters on the endurance testing stands at the Spheros facility in Neubrandenburg.

Spheros certifies ten new service partners throughout Germany

In response to the demand for professionally qualified partners, Spheros now offers a comprehensive network of service partners in Germany.

With the certification of ten service partners, Spheros can now offer a high degree of expertise in buses and systems throughout Germany. All service partners have been thoroughly trained in air conditioning and heating technology, and were required to demonstrate their expertise in a qualification process.

They receive continuous further training in the following areas of support to ensure that they consistently comply with Spheros quality standards. At the same time, great importance is attributed to the support of bus end-customers with the complete range of Spheros products. Spheros service partners are equipped for the following areas and can offer optimum service:

- Advice on and installation of electrical air conditioning systems
- Creation of retrofit solutions (e.g. air conditioning systems such as Citysphere)
- Maintenance and servicing of individual systems by trained professionals
- Preparation of tenders for air conditioning and heater system maintenance
- Professional service according to manufacturer specifications with original spare parts
- On-site service at the end-customer's premises

These facilities are supplied directly with original Spheros spare parts to ensure fast response in each individual case and guarantee high availability of vehicles for the bus customer.



Omnibus Elektronik & Service GmbH in Willich is one of the 10 newly certified Spheros service partners.

Our new service partners are listed on the Spheros website www.spheros.de.

For further details visit our service hotline spheros@spheros.de

or call +49 (0)8105 7721 887
service@spheros.de
or tel.: +49 (0)8105 7721 887.

EBUS Award 2014 for Spheros

This year's EBUS Award – the environmental prize for buses in public transport – was presented to Spheros in the category “Innovative components – air conditioning”.

With this award under the patronage of Alexander Dobrindt, German Federal Minister for Transport and Digital Infrastructure, each year the Forum for Transport and Logistics honours successful projects and innovative products in the field of electric bus transport. In the light of continuously increasing levels of traffic, rising energy prices, declining oil reserves and increasing levels of environmental pollution, the forum wishes to contribute to making mobility both sustainable and forward-looking.

As highlighted by the initiators in the tender: “It doesn't have to be the technology behind the entire bus and its energy supply; individual innovative components in the E-bus also advance technical



Jürgen Haack (centre), Managing Director of Spheros Europa GmbH, at the presentation of the EBUS Award 2014 with Rainer Bomba (on the left), State Secretary in the German Federal Ministry of Transport and Prof. Müller-Hellmann, Forum for Transport and Logistics.

development and motivate passengers to change to E-buses.”

Having convinced the seven-member jury with its HVAC system solutions REVO-E, Citysphere and Thermo H, in addition to its successful realisation and consistent development of energy-efficient air conditioning systems, Spheros was presented with the EBUS Award 2014.

“Receiving this honour fills us with a huge sense of pride and confirms us in our efforts to develop holistic solutions for future customer requirements and ceaselessly forge new paths,” said Jürgen Haack, Director of Spheros Europa GmbH, at the award ceremony on 10 October 2014 in Cologne.



The Spheros trade fair stand at the IAA 2014.

Spheros at the IAA 2014 Hot topics, cold facts

In line with the motto of the IAA 2014 “Shaping the future”, rather than showcasing products, the Spheros presentation at the trade fair from 25 September until 2 October 2014 focused on topics relevant to the future.

Several burning issues are currently preoccupying the bus sector – especially in relation to drives of the future and the role of air conditioning. Discussions on different types of refrigerant and their effects on the environment are also far from being resolved. For bus operators, life-cycle costs persist as discussion topic number one. In this context, reducing the weight of the bus and the efficiency of its components are of central importance.

With its brand new trade fair concept, Spheros was in the lime-light at the IAA, held in Hanover

from 25 September to 2 October 2014. Rather than showcasing the company's products, this year's presentation consisted of a pure communication platform which played host to provocative questions such as “Can a refrigerant fill-up really cost € 2,500?”, “What if every bus stop in Berlin was an inductive charging station?” or “How much diesel is needed to generate electricity?” Constructive discussions took place between bus manufacturers, transport operators and service companies. The main points can be briefly summarised as follows:

The future of public transport

lies in electric mobility, although many questions still remain unanswered, e.g. inadequate battery performance levels. Spheros equipment is the biggest auxiliary user of energy in the bus, and the company is aware of its responsibility in this respect. With a product range already including many E-products, it actively supports manufacturers with intelligent solutions and controls. The geographical, climatic and topographical attributes of the markets are taken into account in this context.

As per the discussion on the refrigerant, it must be borne in mind that Spheros only buys refrigerants – it does not manufacture them. In principle it is possible to work with any refrigerant as long as the underlying conditions and components satisfy the company's requirements.

Spheros is continuously working to optimise life cycle costs (LCC). Maintenance intervals have already been extended, and parts configured to be more durable. Despite this, many operators continue to postpone maintenance work and forget that this leads to

even greater follow-up costs and downtimes. In short: adherence to maintenance intervals is more sustainable and cheaper in the medium term.

Finally, it can be said that the use of intelligent synchronous load thermal management will be essential for ensuring efficient air conditioning in buses of the future. It enables all components to be coordinated and incorporated in the bus on a “communicative” basis, so that they consistently work at an optimum level, irrespective of the driving profile or available energy. This conserves the energy supply and increases the range of the bus.

Spheros is already looking forward to presenting some of these solutions and concepts at busworld Kortrijk and further trade fairs and events in 2015. An overview of the upcoming trade fairs and events for the approaching year will soon be available on our website.



The Spheros trade fair team at the IAA 2014.

Spheros at the FIAA in Madrid, 2014

One of the world's leading events for the bus industry took place in Madrid from 28 to 31 October. With a total of 10,129 visitors and 168 participating companies, the FIAA did even better than in 2012.

The trade fair also succeeded in increasing its exhibition space

by 6%. On a stand of over 40m² Spheros showcased the roof-mounted CC145 air conditioning unit for minibuses (with heating module) and the new Thermo G heater, as well as a cutaway model of the roof-mounted REVO system.



left to right: Pekka Korhonen *, Michael Werlik, Isabel Cristovao *, Sergi Fernandez, Santiago Blanch *, Rainer Kolodzie.

The individuals marked with an asterisk are from the Spheros trade agency Pekka Korhonen Agencia Comercial S.L.

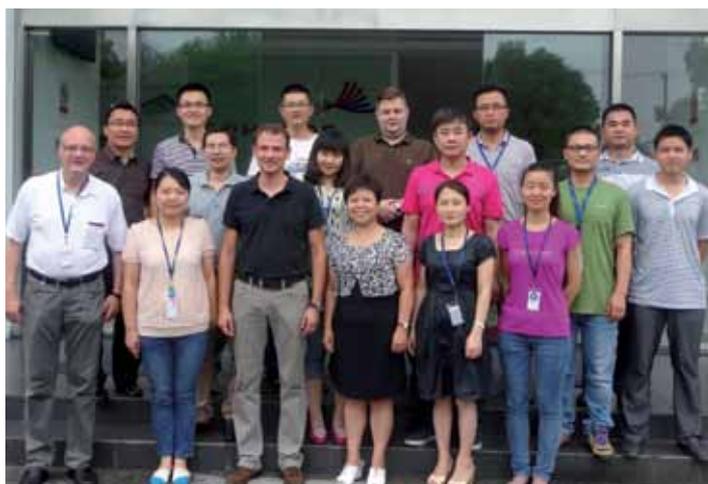


The Spheros stand at the FIAA.

A further highlight at the stand was the presentation of original Spheros parts, which attracted a high level of interest from fleet operators and service points. Before the background of successful conclusion of projects in

the Spanish market, such as the Bahrain contract with 127 Caetano buses and REVO air conditioning systems, the fair was also a good opportunity for Spheros to strengthen its existing business relationships.

Heaters / pumps training

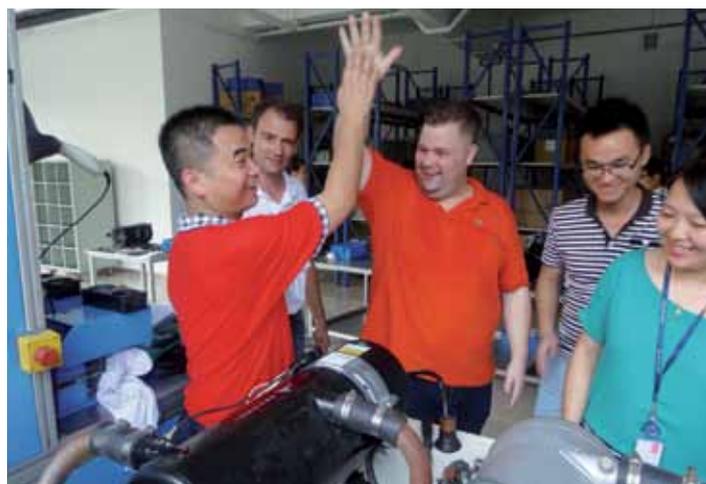


Participants at the training session for heaters and pumps in China.

In early August, Spheros China organised a training session on the topic of Spheros heaters and pumps. Over the course of a week, the group of 25 participants gained in-depth technical know-

ledge of the Thermo, Thermo C and pump range, benefitting from both theory-based and practical training.

"It was also a very valuable



Successful conclusion of a heating device test set-up.

event for me," said trainer Franz Bergmaier/SEU. "We learnt about problems and situations in the market on the basis of discussion and exchange."

Safety and comfort thanks to hatches

The first thing that comes to mind on the subject of bus roof hatches is ventilation. However, a roof hatch has many more uses, depending on its dimensions and material behaviour.

For instance, a bus hatch also creates a feeling of comfort and space by allowing more light into the passenger compartment. Specially designed hatches also add a certain extra to the bus – without compromising the technical attributes they must fulfil.

Another aspect that is often neglected, but is nonetheless of considerable importance, is safety. In an emergency, a roof hatch can save lives. If the bus rolls over, for example, the roof hatch will enable passengers to escape.

Spheros-Parabus, based in Turku/Finland, has been manufacturing roof hatches since the early 1970s. In 2000 Parabus became a member of the Webasto Group, and has been part of the Spheros Group for the past eight years. Currently, Spheros-Parabus produces more than 40,000 roof hatches and emer-



The Modus Comfort City roof hatch from Spheros Parabus.

gency exits per year for use all over the world.

It also manufactures around 6,000 ventilators per year. Spheros-

Parabus supplies customized solutions, whether it is for high-end buses, school buses or mobile homes.



Spheros-Parabus manufactures approximately 40,000 emergency exit hatches per year.



Scania CityWide with the Aerosphere World air conditioning system.

BVG buys 156 Scania CityWide buses with Spheros Aerosphere World air conditioning

Scania, which has hitherto only had a minor presence in Germany's urban bus segment, celebrates a major new order from the Berlin public transport authority (Berliner Verkehrsbetriebe, BVG).

A total of 156 CityWide buses are to be delivered to the customer between autumn 2014 and spring 2015. The vehicles are being equipped with a highly fuel-efficient ZF eco gearbox and the Spheros Aerosphere World 32 kW air conditioning system. The development of a new compressor group with an adapted belt pulley specially configured for the newly-designed drive train was also necessary, contributing to the efficiency of the overall CityWide system.

In addition to this, the BVG has commissioned the Scandinavian company with the construction of a flexible prototype twin-axle double decker bus with a short wheelbase. The bus was designed and manufactured in Finland by Scania subsidiary SOE, and features Spheros air conditioning technology. The split system, consisting of components from the all-aluminium REVO system, will ensure a pleasant climate in the bus.

The collaboration between the BVG and Scania also means that in future the Berlin transport authority will benefit from the Scania service status. This will enable the BVG to maintain and repair its Scania vehicles independently according to the specifications of the Scandinavian manufacturer. For Scania, these prestigious projects with the BVG are certain to set a positive example that will enable it to improve its market position in Germany.

In addition to its cooperation with Scania, the BVG is also carrying out a series of tests on the electric Spheros Citysphere air conditioning system. The tests are being performed to ascertain the potential for savings in fuel consumption. Next year, the results will be employed to determine whether the BVG opts to revise its previous air conditioning concept.

Air conditioning package deluxe

In a test by German trade magazine Lastauto Omnibus, the new top model S 516 HDH from Setra was awarded a 'straight A'. Spheros is supplying its premium component in the air conditioning segment with a completely revised heating and air conditioning concept.

The Aquasphere II is now standard equipment in this cutting edge technology. Thanks to the division into two large climate control zones – front and rear – all passengers enjoy the same relaxation and comfort. Furthermore, every seat has three separate sources of warm and/or cool air: an outlet in the service set above the seat, a window sill that is temperature-controlled at all times, and – something that is unique in a coach – a heat outlet beneath each seat.

The (optional) under-seat fan heating patented by Spheros, with a sidewall heater and heat exchanger, transports the warm air directly to the passenger's feet and ensures a high level of comfort as well as rapid and economical heating of the passenger compartment. The Bus Top Premium roof hatch rounds off the air conditioning system offered by Spheros.



Setra 516 HDH with the Aquasphere II AC system and Bus Top Premium roof hatch.

Photo: © Daimler Benz

New: CC145 air conditioning system for minibuses with heating module

In response to strong market demand, especially on the Iberian peninsula, Spheros now offers the ‘heating & cooling’ version of the CC145 AC system with a 9 kW heating module.

At low outdoor temperatures, the heating function in the roof acts as a booster to the floor heating.

With its aerodynamic design and 12kW cooling capacity, the system is ideally suited to mini-

buses with 9 to 28 seats. The variable air stream alignment of the CC145 ensures a pleasant interior atmosphere. The evaporator fans can be positioned either in the centre channel or in the side air ducts. The system, which is easy and quick to install, can now be ordered with both central and lateral air intakes. It is designed for original equipment and retrofitting purposes.

In early 2014 the first seven prototypes intended for overseas export to an end-customer of Spheros USA were installed by Spanish company Carrocero UNVI.

The CC 145 is manufactured in Turkey – since 2010 as a version minus heating module – and with over 350 unit sales it is the best-selling Spheros air conditioning system on the Spanish market. The Wing and Mobi models from INDCAR and the VEGA model from bus designers UNVI are likewise equipped with this air conditioning system. The Mobi is manufactured by INDCAR in Romania. Portuguese company Carbus is the main buyer in the retrofit sector.



The VEGA bus from UNVI with the CC145.

The Sileo electric bus from Bozankaya: environmentally friendly and efficient.

Electric mobility has been the talk of the automotive sector for some time – not just for powering cars, but also for urban buses. Bozankaya has made a name for itself since the last IAA Commercial Vehicles trade fair in Hanover.

Against the trend of leading European hybrid bus builders, the Turkish manufacturer presented its new all-electric urban bus Sileo to professional visitors at the trade fair.

The key technical data of the vehicle indicate an interesting concept. Weighing in at just 12 tonnes, the 10.7 metre long bus promises a range of at least 200 km. This is achieved with the new technology consisting of lithium-yttrium-ion batteries, a SCL (single-cell-loading) battery charging system developed by the company itself and clever incorporation of auxiliary equipment. Consequently, the Sileo features the electric Spheros Citysphere air conditioning system in its passenger compartment. This can also



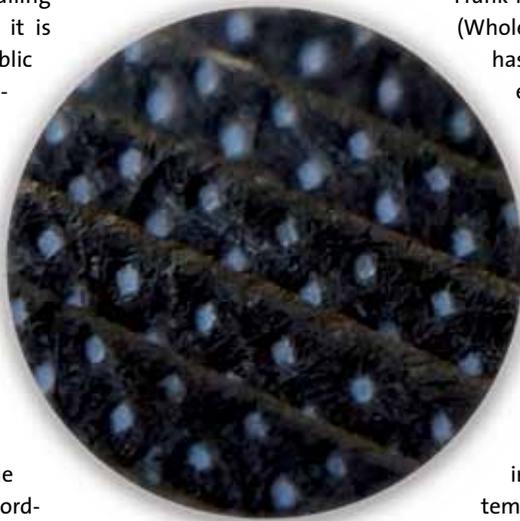
The Sileo electric bus from Bozankaya with the Citysphere air conditioning system.

operate as a plug-and-play solution without an engine-mounted compressor drive. The Citysphere S air conditioning system will soon be additionally installed in the driver's section. The vehicle's heating system also deserves mention: it was not implemented with energy-saving (and thus range-reducing) electricity, but with a diesel-powered Spheros Thermo S 230. Bozankaya realised that a heating system powered by diesel in the stationary state with minimal emissions is a meaningful complement to the bus electrification, and therefore contributes to its serviceability. The Sileo is thus distinguished by environmentally friendly electric operation and practically-oriented operational capability.

Fresh air filters must be fresh

Besides cool air, professional air conditioning systems also provide fresh air in the bus. To ensure that this is always the case, these systems have specially-designed filters that ensure the air drawn in from the outside is free from dust, soot and other impurities. Additionally, fresh air filters protect the individual components in the air conditioning system against dirt and deposits.

The bus is the operator's calling card, regardless of whether it is used for excursions or public transport. Efficient air conditioning is thus a key component of the vehicle. In order to offer the customer adequate travel comfort, the air that is conditioned by such systems must be as free as possible from impurities. This requires the fresh air filters to be changed at regular intervals. The recommended time for such a change differs according to the region and air pollution level, but should generally be carried out at least twice a year.



Clogging of filters – detailed view.

Frank Röse, bus specialist at GMT (Wholesaler Southern Germany), has gained substantial experience in the operation and maintenance of air conditioning systems. "If the filters become clogged with impurities, not only the air performance is reduced. Pressure on the fan also increases, causing greater wear to components. This in turn leads to pressure-related faults in the air conditioning system that eventually cause the system to fail. Not to mention the loss in air quality for passengers," explains Röse. In addition, the bus

interior becomes dirtier, resulting in increased cleaning needs.

For this reason only original filters should be used. This is because the material and fit are specifically geared to system requirements, providing a 100% match. "Every now and then we get a call from a customer who has installed imitations and is experiencing major difficulties with his system," Röse reports. "Whether it's the tightness of the filter frame, the durability of the material or faster clogging with particles, our claim is repeatedly confirmed: only the original product is system-compatible."



Comparison: New fresh air filter and filter after 3 months' use in normal road traffic conditions.

Fuel pumps with aluminium caps

Conversion of fuel pump caps from brass to aluminium on the Thermo and Thermo S heaters

Since November 2014 Spheros has also been using aluminium fuel pump caps on its Thermo and Thermo S heaters. This has the advantage of reducing the amount of copper used in the fuel system. It is especially relevant to the use of large biodiesel components.

Because copper reacts with biodiesel, the latter ages faster. This may cause deposits to develop in the fuel system.

The use of aluminium also contributes to weight savings in the vehicle that have a positive impact on fuel consumption.



Brass cap



Aluminium cap

TECHNOLOGY

New: Alternative device for CO2 measurement in all Spheros heaters



Advantages (compared with the MSI Dräger Vario X measuring device):

- Rapid access to measured and calculated values via selector switch
- Integrated condensate filtering in the measuring device, condensate trap completely removable
- Long service life with standard retail batteries
- Visual CO2 measuring technology (infra-red), no consumable O2-sensor

Pos.	Designation
Case	CO2 measuring device with protective cover, storage case* and sampling probe with terminal
Accessories	Care set for CO2 measuring devices (O-ring, special lubricant, hose - coupling)
Replacement	Particle filter VPE 2 units
Replacement	Filter hood with O-ring

* Case includes a protective cover with a magnet. This enables the device to be attached to your vehicle or toolbox. Also, with the special sampling probe with terminal, your hands are free.

Case and parts available from specialists



Technical data:

Measurement of the CO2 concentration:

Measurement range: 0...20.0 Vol% CO2
 Resolution: 0.1 Vol%
 Tolerance: ffi± 0.2 Vol%,
 to.97-time ffi 50s

Other data:

Operating temperature: + 5°C ... + 40°C
 Transport and storage temperature: - 20 ... + 50 °C

Thermo S with CAN controller

A different procedure for releasing the heater interlock is required on the Thermo S CAN heater than with the Standard Thermo S.

We wish to advise users and workshop personnel that the release of a heater interlock on the Thermo S CAN heater such as fitted in a wide range of EVO buses differs from the Thermo S Standard.

These heaters are distinguishable by the warning symbol affixed to the heater cable tree of the Thermo S CAN.

With heaters of this type, releasing by separating the plug connectors between the heater cable tree and vehicle cable tree is NOT permitted.

This procedure may damage the control device and result in the warranty becoming invalid.

Three different options are available for releasing the heater interlock:

1. Releasing the heater interlock by Spheros STT diagnosis

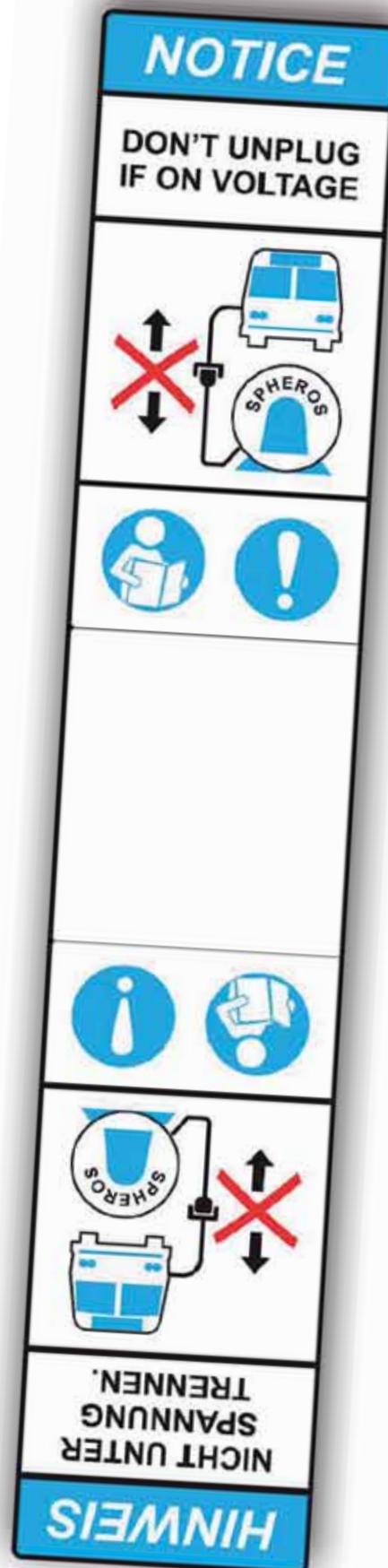
- Read the heater error memory by STT diagnosis
- Disconnect the interlocked heater from the vehicle electrical system for > 10 seconds by removing the vehicle's fuse
- Rectify the cause of the heater interlock
- Restore the connection to the vehicle electrical system by fitting the vehicle's fuse
- Delete the error memory via Spheros STT diagnosis

2. Releasing the heater interlock with CAN diagnosis

- Read the heater error memory via CAN diagnosis
- Disconnect the interlocked heater from the vehicle electrical system for > 10 seconds by removing the vehicle's fuse
- Rectify the cause of the heater interlock
- Restore the connection to the vehicle electrical system by fitting the vehicle's fuse
- Delete the error memory via CAN diagnosis

3. Releasing the heater interlock by disconnecting the power supply

- Disconnect the switched-on and interlocked heater (vehicle battery isolating switch is "on" or the heater is in overrun) by removing the vehicle's fuse
- Rectify the cause of the heater interlock
- Reconnect to the vehicle electrical system by inserting fuse



Topic of the day: Testing heaters / circulation pumps

Air Conditioning

Heating systems

Hatches / Fans

Control units

Service

Genuine parts



Some like it hot ...

An important part of our product development regime is testing to the end of the service life. Our salt spray mist chamber in Neubrandenburg, for example, enables the heaters and individual components to be exposed to an environmental simulation. As our heaters are used in different altitudes, we also test them in the Alps at altitudes of up to 2,800 m.

Environmental simulation testing

A corrosive atmosphere is created in the testing chamber by spraying a saline solution to accelerate corrosion on the test-piece. By varying the concentration of the saline solution, the temperature and pH value, the actual environmental conditions can be accelerated at different rates.

Endurance testing of circulation pumps

With the modern endurance test bench, up to ten circulation pumps can be tested fully automatically under application-oriented conditions. The test bench consists of a climate chamber, a heating and cooling aggregate for the water circulation and a storage tank to which the supply lines with the

measurement and control devices are attached. A measuring cabinet for recording the measured values and supplying the aggregates is a further component of the test bench. The system includes a medium and environmental temperature control. The system pressure and the corresponding flow rate can also be set at different levels.

Additional test benches at our site in Neubrandenburg:

- Accessible climate chamber (temperature range -40°C to +100°C)
- Temperature shock chamber (temperature range -70°C to +200°C)
- Endurance testing of heaters
- Engines measurement test bench
- Fuel pumps test bench

