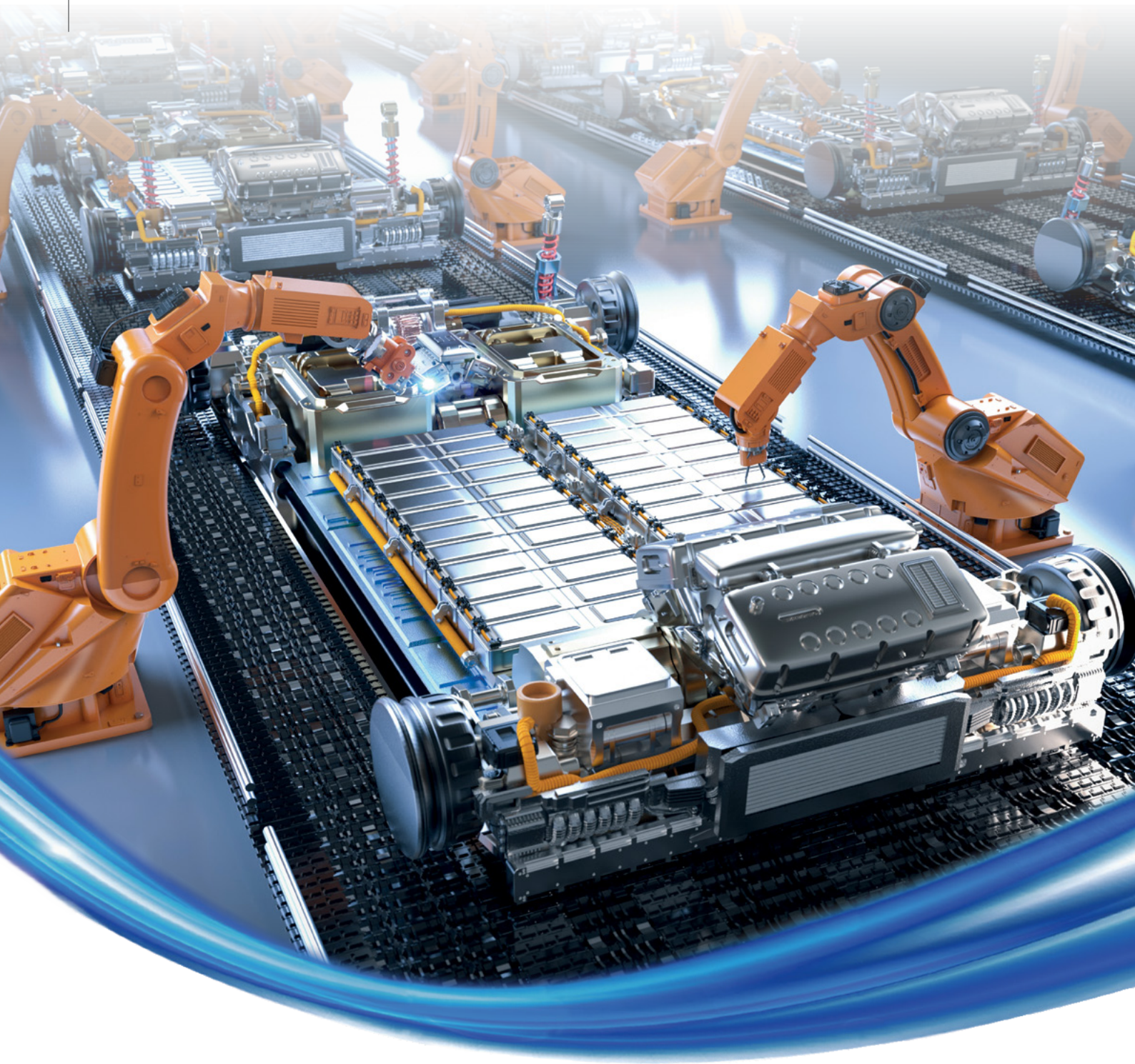
Electric Vehicle & Battery Manufacturing

How To **Achieve High-Quality, Sustainable** Compressed Air



White Paper

CompAir

Contents

Introduction
The **Rapidly Growing Global** Electric Vehicle & Battery Market

In a world of environmental and economic uncertainty and urgent climate change goals, sustainable alternatives are constantly being implemented to promote a greener future for generations to come. Over the last few decades, the transportation, automotive and vehicle sectors have been discovered as some of the largest global emitters of greenhouse gases. This has created and driven an electric revolution, with electric cars and batteries leading in the race towards a more sustainable future. Some of the world's most advanced, prolific car manufacturers are already involved, with industry giants currently in pole position. To stay in the race against climate change, it has become increasingly important for electric vehicle and battery manufacturers to operate efficiently and sustainably. **This is where high-quality compressed air comes in!**

In this Whitepaper, **you will discover:**

- The importance of compressed air in EV and battery manufacturing
- How you can achieve high-quality, sustainable compressed air
- High-performance compressed air solutions and services ideal for EV and battery manufacturers

The **Importance** of **Compressed Air** in EV & Battery Manufacturing

Compressed air plays a fundamental role in the manufacturing of electric vehicles and batteries for a variety of different applications. This includes:

Electric Vehicle **Manufacturing**

Powering Air-Operated Tools & Conveyance Systems

Powering air-operated tools and material-handling conveyance systems are two fundamental tasks within an electric vehicle manufacturing plant, as they aid the efficiency of lifting, positioning and assembly equipment. Electrical vehicle assembly, in particular, requires a steady stream of clean, dry, compressed air to power assembly tools and conveyance systems. Whether you are fastening together components, using high-pulse tools or transporting components, compressed air is the driving force behind car assembly. But, like powering any pneumatic air equipment, you have to be aware of the impact moisture has on the degradation and condition of your equipment. Therefore, a downstream system is essential here to ensure your compressed air is clean and moisture-free!

The conveyance of products also requires a pressure difference between the start and end of the pipeline. This is vital to ensure your conveyance and handling equipment works efficiently without any unexpected breakdowns! To make sure your compressed air equipment is operating at the optimum pressure, power, and flow rates, an air audit is recommended, which will assess your existing equipment. From here, adjustments can be made, or an entirely new system can be implemented to accommodate the specific pressure requirements that come with conveying products and materials!

Blow-Off Applications

Blow-off applications involve the cleaning of containers before filling them with products, as well as the cutting, shaping and conveying of materials from one place to another. Air quality is important here, as contamination can detrimentally impact the final product. Air quality can be assured with an effective downstream system!

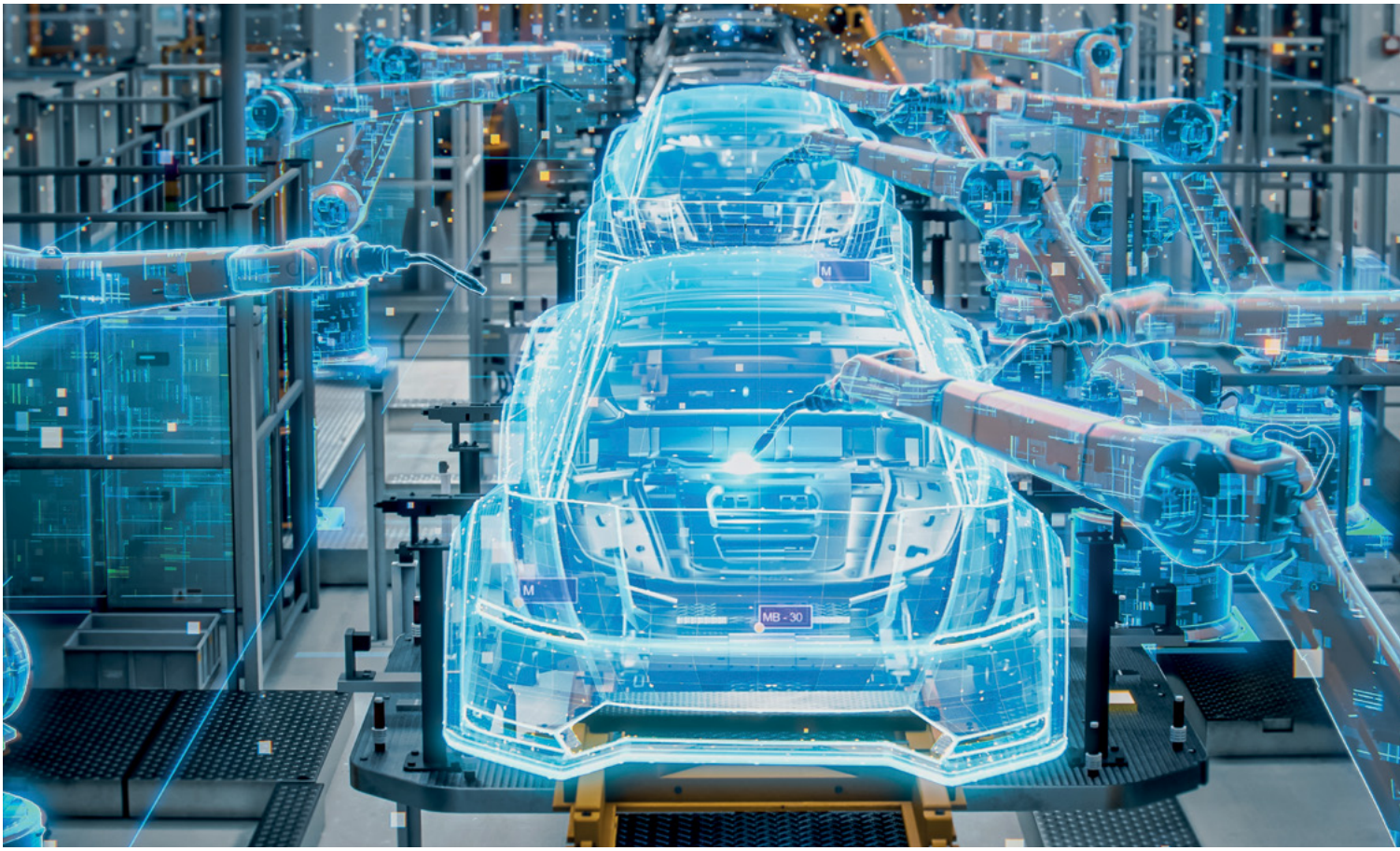
Servicing **& Repair**

The processes involved in the servicing and repairing of electric vehicles, whether it may be inflating tires, sanding, repainting, or powering the tools to fix them, all require a steady stream of high-quality compressed air. An air audit would be ideal to ensure your equipment is up to the job, followed by the implementation of a reliable downstream system to maintain and guarantee air quality.

General **Automotive Manufacturing** Applications

Much like in non-electric vehicle manufacturing, compressed air is used for a variety of automotive processes. One example is stamping, which refers to cooling steel and other materials to form shapes and contours. Most vehicle components are crafted this way, including roofs, bonnets, floors, doors and engine compartments, as well as the general body and sides of the car. Stamping involves the use of heavy-duty presses that require compressed air to operate. To weld the stamped parts together, robots powered by compressed air are used.

Another general automotive manufacturing application that requires compressed air is bodywork painting, which uses pneumatic sprayers and paint guns. These tools require clean, dry compressed air that is free from oil or contaminants to prevent moisture from rusting the equipment. To ensure all moisture is removed from your air stream, it's important to consider an effective downstream system, with either a refrigerated or desiccant dryer, as well as a reliable filtration solution. For painting, a desiccant dryer is recommended, as they are renowned for their ability to produce ultra-dry air with a low dew point!

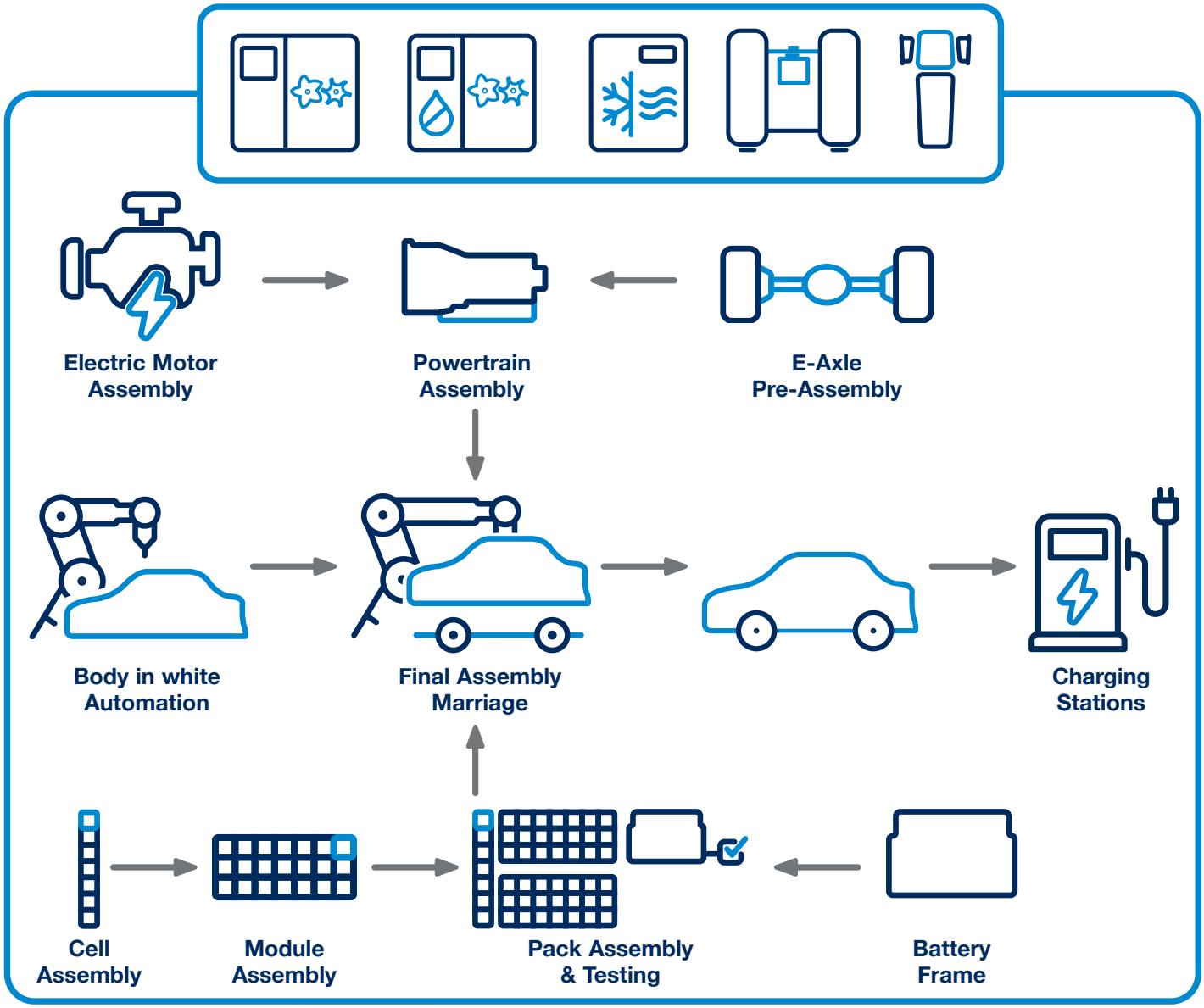


Electric Vehicle Battery **Manufacturing**

The basic principle behind the manufacturing of EV batteries is the process of producing a negatively charged anode and a positively charged cathode, as well as an electrolyte that separates the two. These form the individual battery cell, which can then be enclosed in a steel or aluminium casing that holds it together and protects the cell from any damage. But what role does compressed air play in this process?

From the production of the electrodes to the assembly and finishing of the battery cell, compressed air is a vital part of EV battery production. Its main uses are for inserting the positive and negative electrodes into the cell casing, as well as cooling the cells to ensure a tight fit, reliable connection and stable environment for the electrodes. It is also used to provide cooled air for cooling processes and to help maintain optimal operating temperatures for machinery and furnaces. Compressed air also helps to clean the final battery cell. As mentioned, it is also essential for powering pneumatic tools and conveyance systems throughout the entire EV battery manufacturing process.

Compressed Air at Different Stages of the **Manufacturing Process**



Taking the **Pressure Off**

Identify & **Resolve** Inefficiencies & Problem-Areas to Achieve High-Quality, Sustainable, Compressed Air within EV & Battery Manufacturing

Ensuring Equipment is **up to the Job**

If you're looking to maximise the quality of your compressed air, as well as the sustainability of your operations, the best place to start is with an air audit. These can be as simple or as comprehensive as you require, as they work by fixing a data-logging unit to your compressor for a fixed period of time. This is an effective way to identify where your compressed air system is by looking at your air needs, pressure requirements, and your current power and energy use and efficiency. Engineers can then identify any inefficiencies or potential areas of improvement and either suggest machine enhancements or design and install an entirely new system that better suits your requirements. This will assist you in having the right size compressors that have the specifications your operations require, preventing wasted energy and ensuring you're operating at your most efficient and productive.

Another way to ensure your equipment is up to the job is a process called oil sampling. This will provide you with a detailed analysis of any abnormalities and contamination that might be impacting the quality of your air and the running of your system. Looking at any external contamination will give valuable insights into the ambient conditions that may be impacting your lubricant, and examining any internal contamination can provide you with warnings regarding the degradation or potential malfunctioning of your components.

High-Performance, **Sustainable Compressed Air Solutions**

Electric vehicle and battery manufacturing has a large range of process and application requirements. For example, some processes may specifically require 100% oil-free air, others may require ultra-dry compressed air. Some plants want more eco-conscious solutions that fit in with their sustainability goals, whereas others may also want to focus on productivity and efficiency. Understanding your exact needs is essential when choosing the compressed air solutions you use for your manufacturing processes! This applies to the size, flow, volume and pressure of your compressors, as well as the downstream and air treatment equipment you need. Getting this right will ensure your air is of the correct quality, that you are reducing wasted energy and that you are operating in a more efficient, sustainable way.

Downstream Equipment to **Maximise Air Quality** & **Sustainability**

The easiest way to guarantee the quality and sustainability of your compressed air is by implementing a reliable, high-performance downstream system. This consists of 3 key components:

Dryers

The first key component of an effective downstream system is a compressed air dryer. The main role of a dryer is to remove any moisture from your compressed air. As mentioned throughout this Whitepaper, moisture is the enemy of any pneumatic or conveyance tools due to its role in the acceleration of equipment degradation. By powering these tools or systems with moisture-contaminated, low-quality compressed air, you are drastically reducing their performance and longevity!

Depending on the application, differing dew points of between +3ºC down to -70ºC may be required. To achieve this, different dryer technologies come into play, like refrigerant dryers, subfreezing dryers or varying types of desiccant air dryers. When comparing these options, refrigerant dryers are better suited to more general EV manufacturing applications, whereas desiccant is the ideal choice for producing ultra-dry, high-quality compressed air at a lower pressure dew point.

If you're looking to maximise the sustainability of your operations, you could also opt for a heat of compression dryer that uses waste heat of an oil-free compressor. Heat is a natural by-product of the compression process, so it makes sense to reuse it for other tasks. These dryers are considered the most sustainable, energy-efficient drying solutions for pressure dew points down to -40ºC on the market!

Filtration **System**

The second key component for effective air treatment is a reliable filtration system to remove impurities such as oil, dust, solid particulates and moisture from your compressed air. Removing these contaminants from your compressed air helps to ensure your air is of a high quality. This is essential for applications such as powering pneumatic tools, conveyance systems, and battery manufacturing, as well as for the painting and finishing of your electric vehicles.

Condensate **Management** & **Treatment**

Condensate management and treatment is an often overlooked component of a downstream system, but it really is vital to maximise your air quality and the sustainability of your operations! Condensate, like heat, is a natural by-product of the compression process and can have detrimental impacts on both the longevity and performance of your equipment and the quality of your compressed air. As mentioned when discussing the applications of compressed air within EV and battery manufacturing, condensate, or moisture, can cause your pneumatic and conveyance equipment to rust and corrode. This increases your risk of downtime due to faulty or unreliable equipment, which can also cause safety hazards. Therefore, implementing a condensate management system that is fully equipped with drains to remove moisture and condensate is essential! As part of this system, an oil-water separator will separate oil from your condensate before relying on the drains to expel it from your compressed air system. The oil water separator is a vital part of this process, as it ensures that condensate is correctly and efficiently disposed of in a way that adheres to strict industry and sustainability requirements!

Maximising Sustainability & Energy Efficiency & **Reducing Waste**

The process of compressing air for use in the electric vehicle and EV battery manufacturing process generates a significant amount of heat, which would normally be lost to the atmosphere.

Up to 98% of the heat that is generated during the compression process can be recovered. This energy can be harnessed to provide process water heating, reaching usable water temperatures of up to 85ºC. It can also be used for heating, other industrial processes and hot air blasting.

Significant energy and cost savings can be achieved with efficient integrated heat recovery systems – which can usually be factory-fitted or supplied as retrofit kits, including all necessary pipework and fittings. These systems can help you maximise your energy efficiency whilst also making sure that you are operating in a more sustainable, eco-conscious way!

On-Going **Maintenance** & **Protection**

Correctly maintaining and looking after your compressed air system is vital to keeping your EV and battery manufacturing plant running at optimum productivity and efficiency! It also helps to ensure your system is continuously and sustainably producing high-quality compressed air in a way that helps to reduce your carbon footprint. Predictive and proactive maintenance plans are the way forward, with remote monitoring systems transforming the ways in which you can protect and look after your equipment. Understanding the maintenance plans, genuine spare OEM parts, warranties, and other compressed air services available to you is the first step to optimising your EV and battery manufacturing plant!

CompAir's **High-Performance Compressed Air Solutions** for EV & Battery Manufacturing

Regarding compressed air solutions for the EV and battery industry, we provide high-performance, efficient systems for a range of different manufacturing and charging needs, including:

Manufacturers of EVs

A typical product used by electric vehicle manufacturers, is our DX Series, which is a range of 100% oil-free rotary screw compressors available in both fixed and regulated speed (RS) models. As mentioned, many manufacturing applications, such as powering tools and conveyance equipment and the painting and finishing of EVs, require clean, dry, compressed air. Our DX solutions offer up to 8% higher flow when compared to the industry standard and offer unmatched further savings with optional heat recovery. Therefore, not only are you ensuring your air is 100% oil-free, but you are also operating more sustainably!

Larger manufacturing plants also benefit from the use of centrifugal compressors. Renowned for their market-leading efficiency and reliability, they are the perfect addition to any EV and battery manufacturing plant.

Ancillary Manufacturers

Our DX Series is also ideal for ancillary manufacturers who rely on a higher quality of air for their operations. We understand that there's a lot riding on the quality of your air, with the presence of condensate, oil, vapor and particles having a detrimental impact on your operations. From downtime, product spoilage and recall, and damage to your brand reputation to worst-case scenarios such as harmed customers and product liability, it's essential that your compressed air is of the high standard required to safely manufacture the necessary EV and battery ancillary. This is where CompAir's DX Series, fully equipped with **"PureAir"** Technology, comes in!

We also offer our lubricated **"FourCore"** range, which balances two-stage efficiency with a single-stage footprint by embodying a sustainable design for eco-conscious businesses. Still able to produce 100% oil-free air when equipped with effective downstream and filtration equipment, this range boasts safe and economical operation as well as excellent accessibility to its inner workings, contributing to its low maintenance costs. Across the market, the core benefit of the new L160FC to L290FC range is that it offers greater efficiency and one of the smallest footprints of 2-stage oil-lubricated units on the market.

Air Treatment & Downstream Equipment

As we mentioned earlier, the simplest way to ensure your compressed air is meeting both quality and sustainability requirements is to implement an effective downstream and air treatment system! From efficient filters, refrigerant dryers, heatless and heated desiccant dryers to heat recovery and condensate management systems, CompAir has all the equipment, designed and manufactured in-house, required to build a downstream system you can rely on!

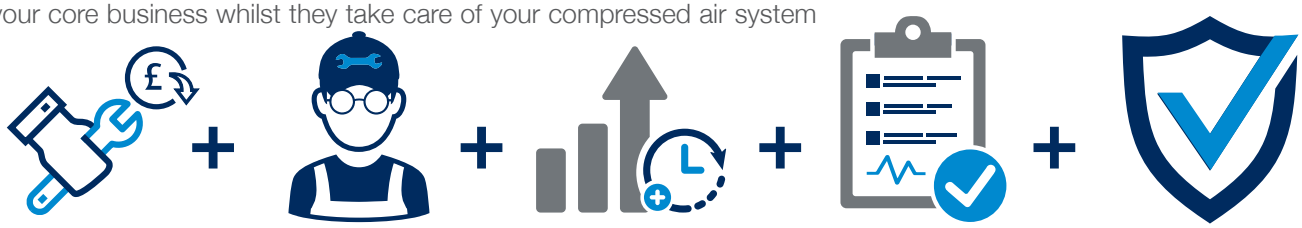
Invest In Your Future
with a Trusted Partner

Rest Assured - Stay Protected With CompAir's Comprehensive Warranty

Cover your airend and protect your investment for up to 10 years with CompAir's Assure Service and Warranty Agreements.

You Can **Enjoy**

- Increased Uptime through reduced unplanned downtime and costly production interruptions
- Peace of mind with an extended warranty
- Lower cost of ownership with cost-effective solutions based on your customised maintenance strategy
- Quality results are guaranteed by factory-trained technicians, allowing you to focus on your core business whilst they take care of your compressed air system



Lower Cost of Ownership | **Quality Results** | **Increased Uptime** | **Efficient Energy Use** | **Peace of Mind**

CompAir **Genuine Spare Parts**

You can also enjoy complete peace of mind with genuine CompAir parts and lubricants, which ensure that your compressed air system is operating reliably and efficiently whilst also being maintained at the highest standards. Our genuine spare parts and lubricant are distinguished by:

- Minimum losses contributing to unmatched, sustainable energy savings
- Long service life, even under challenging and harsh conditions
- Their quality which is ensured as they are manufactured with the strictest Quality Assurance Systems
- High reliability and efficiency, which helps to improve plant uptime

Stay Connected with iConn - CompAir's Smart Compressor Service 4.0

iConn is CompAir's response to the Industry 4.0 and IIoT (Industrial Internet of Things) revolutions, which have become crucial for the development of compressed air technology. These movements have enabled digital connectivity and revolutionised the way that we can communicate with our compressed air equipment. iConn embodies these advancements, providing compressed air users with real-time, in-depth knowledge about their system. With live minute-by-minute monitoring of all data points and predictive analytics, you can stay in touch with your compressed air - anytime, anywhere - for increased efficiency, productivity and protection!

Benefits and Features of iConn:

- Comprehensive, real-time, 24/7 machine data which allows for precise production planning to protect your investment
- Alarm system to alert you of any potential issues before they become costly downtime
- Pro-active rather than reactive service with on-time assure service plans, predictive maintenance and warranty
- Optimised compressor performance and servicing enabled by the right information at the right time
- Tailored service depending on your exact requirements, giving you complete peace of mind
- Optimised efficiency and reduced downtime with prompt maintenance to increase efficiency
- Reduced downtime with intelligent, energy-efficient uptime

iConn is a standard factory feature on our new compressors or is available as a simple upgrade. It is also available on all of our oil-free and oil-lubricated compressed air solutions. Work smart and enhance your productivity with CompAir's iConn Connected Air Solution!

About CompAir

With over 200 years of engineering excellence, the CompAir brand offers an extensive range of highly reliable, energy efficient compressors and accessories to suit all applications.

An extensive network of dedicated CompAir sales companies and distributors across all continents provide global expertise with a truly local service, ensuring our advanced technology is backed up with the right support.

As part of the worldwide Gardner Denver operation, CompAir has consistently been at the forefront of compressed air systems development, culminating in some of the most energy efficient and low environmental impact compressors on the market today, helping customers achieve or surpass their sustainability targets.

www.compair.com **sales@compair.com**

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