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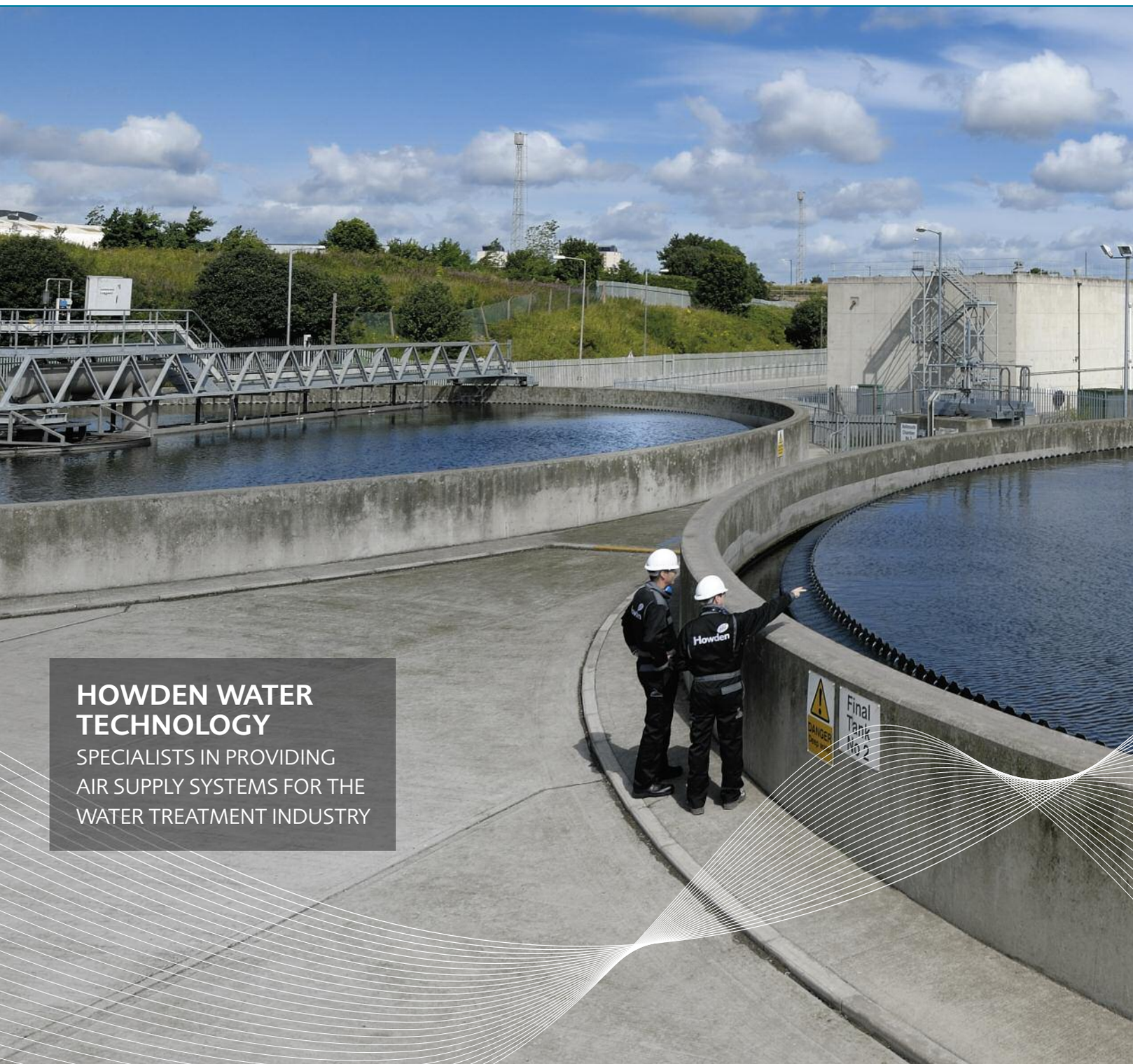
Howden

HOWDEN WATER TECHNOLOGY

TURBO COMPRESSOR SYSTEMS FOR THE WASTE WATER INDUSTRY

A NEW BENCHMARK FOR ENERGY EFFICIENCY AND CONTROL

PART OF THE HOWDEN GROUP, HOWDEN WATER TECHNOLOGY IS A CENTRE OF EXCELLENCE SUPPLYING HIGH EFFICIENCY TURBO COMPRESSOR SYSTEMS DEVELOPED TO MEET THE SPECIFIC NEEDS OF THE WASTE WATER INDUSTRY.



HOWDEN WATER TECHNOLOGY

SPECIALISTS IN PROVIDING AIR SUPPLY SYSTEMS FOR THE WATER TREATMENT INDUSTRY

WORLD CLASS APPLICATION ENGINEERING

Howden Water Technology (HWT) is Howden's centre of excellence for turbo compressors and associated equipment for the waste water industry. Working on every continent, and with companies in 16 countries, Howden has made an enormous contribution to environmental improvements within vital industries such as power generation and petrochemical refining. With over a thousand installations worldwide, Howden turbo compressors are the proven, reliable choice for optimal performance. HWT is an invaluable source of application expertise as well as a supplier of complete, integrated aeration systems, bringing a unique combination of experience and flexibility to the market.

EXPERTISE BUILT ON EXPERIENCE

Howden has been supplying compressors to waste water treatment plants for over fifty years. By combining our high efficiency turbo compressors with sophisticated downstream control systems developed especially for water treatment, we can offer the most advanced and efficient aeration systems available.

The need to minimise energy consumption, whether for cost or environmental reasons, has become a factor of enormous significance, and the aeration system is responsible for by far the largest proportion of the energy consumption in any aerobic waste water treatment plant.

Howden turbo compressors can provide the lowest footprint and highest flow. The exceptional performance is based on a third generation high performance impeller that enables the compressor to operate 8-10% below the surge line during normal running, giving a very high margin when compared to other compressors available. The whole system is governed by a modern control system incorporating an easy-to-use human-machine interface. Over the lifetime cost of the equipment, Howden technology offers the highest cost savings through a combination of energy efficiency and the reliability offered by our 'built to last' philosophy.

THE POWER BEHIND THE PROCESS

OVER THE LIFE OF THE PLANT, HOWDEN TURBO COMPRESSORS ARE BY FAR THE MOST COST EFFECTIVE TECHNOLOGY AVAILABLE. THEIR CAPITAL COST WILL QUICKLY BE OFFSET BY LOWER ENERGY EXPENDITURE, TYPICALLY AS EARLY AS THE FIRST 12 TO 36 MONTHS OF OPERATION, LEAVING DECADES FOR THE SAVINGS TO GROW.

Howden turbo compressor technology has an installed base numbering over one thousand units worldwide. These machines typically run for decades without any intervention except minimal planned maintenance. Their robust success is a testimony to the quality of their engineering, and their track record is a provable fact.

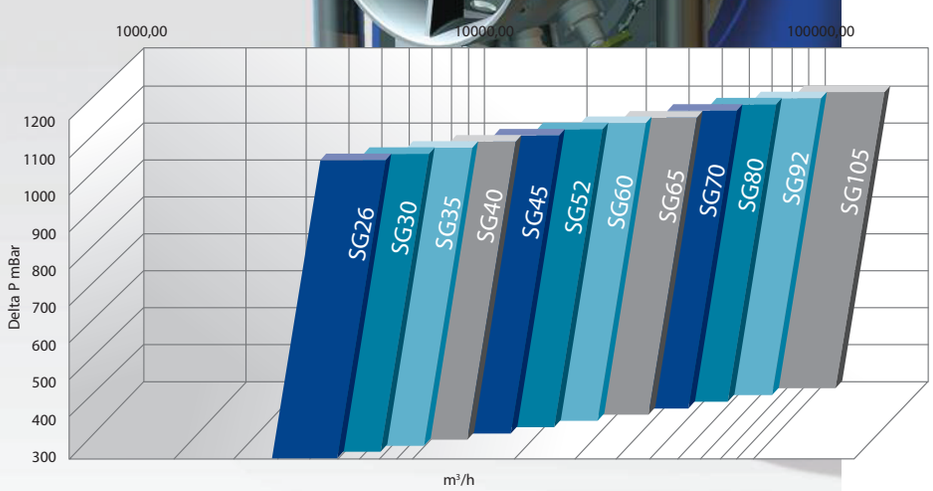
Howden Water Technology offers a choice of 12 frame sizes with a capacity range of 4,000 to 140,000 m³/h, covering the most extensive duty range on the market. With the widest volume and pressure range available, HWT can supply a product to meet any demand our clients have – and with achievable efficiency levels exceeding 87%, Howden is the natural choice for water treatment plants.

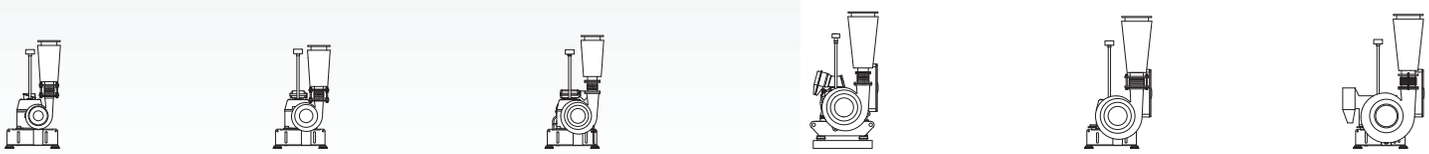
Our turbo compressors are designed to provide plant operators with efficiency across the actual operating range. Exceptional turndown capability is built in as standard to ensure that when plants are operating at low load, the efficiency of the aeration system is unaffected. Howden Water Technology products will maintain effectiveness through the full flow range, including the key 60-80% window and dropping to as low as [illegible] capacity when required.

Every unit we supply is fitted with dual vane compressor regulating systems, comprising both variable inlet guide vanes and a variable vane diffuser system. The inlet guide vanes create a pre-rotational air swirl before the air reaches the impellers, adding significantly to the efficiency of the equipment at turn-down duty, and the variable vane diffuser is designed to control the pressure build-up at the impeller discharge while also regulating the compressor capacity.

Prior to shipment each unit is fully factory tested. We offer the choice of testing to ASME PTC10-1997 or ISO 5389 specification, and supply the performance certificate, at the customer's request.

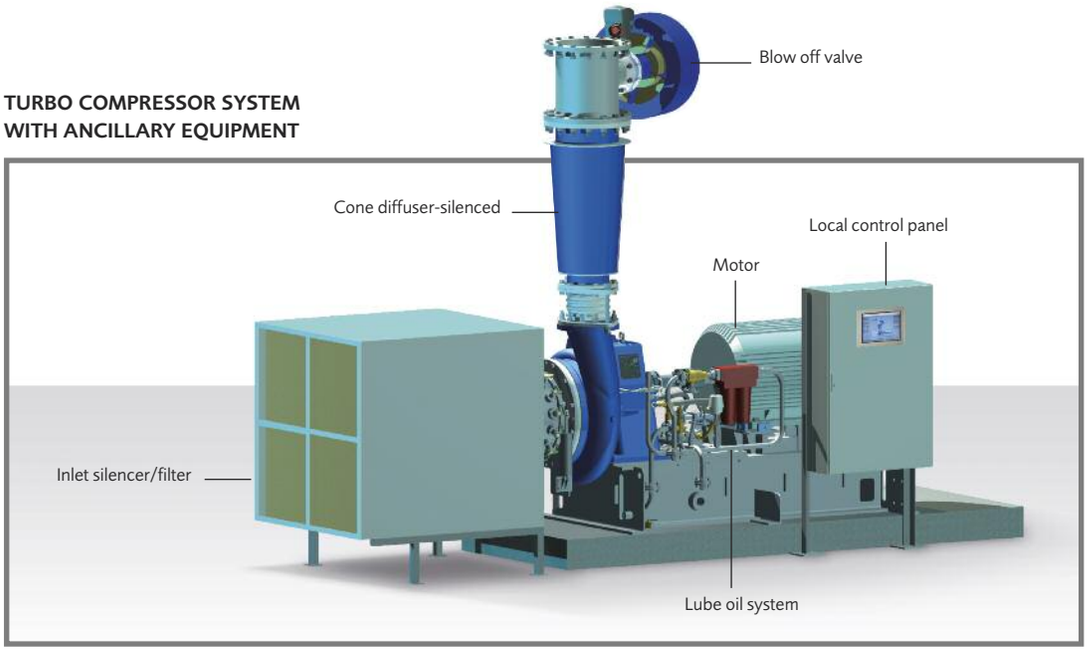
HOWDEN COMPRESSOR RANGE

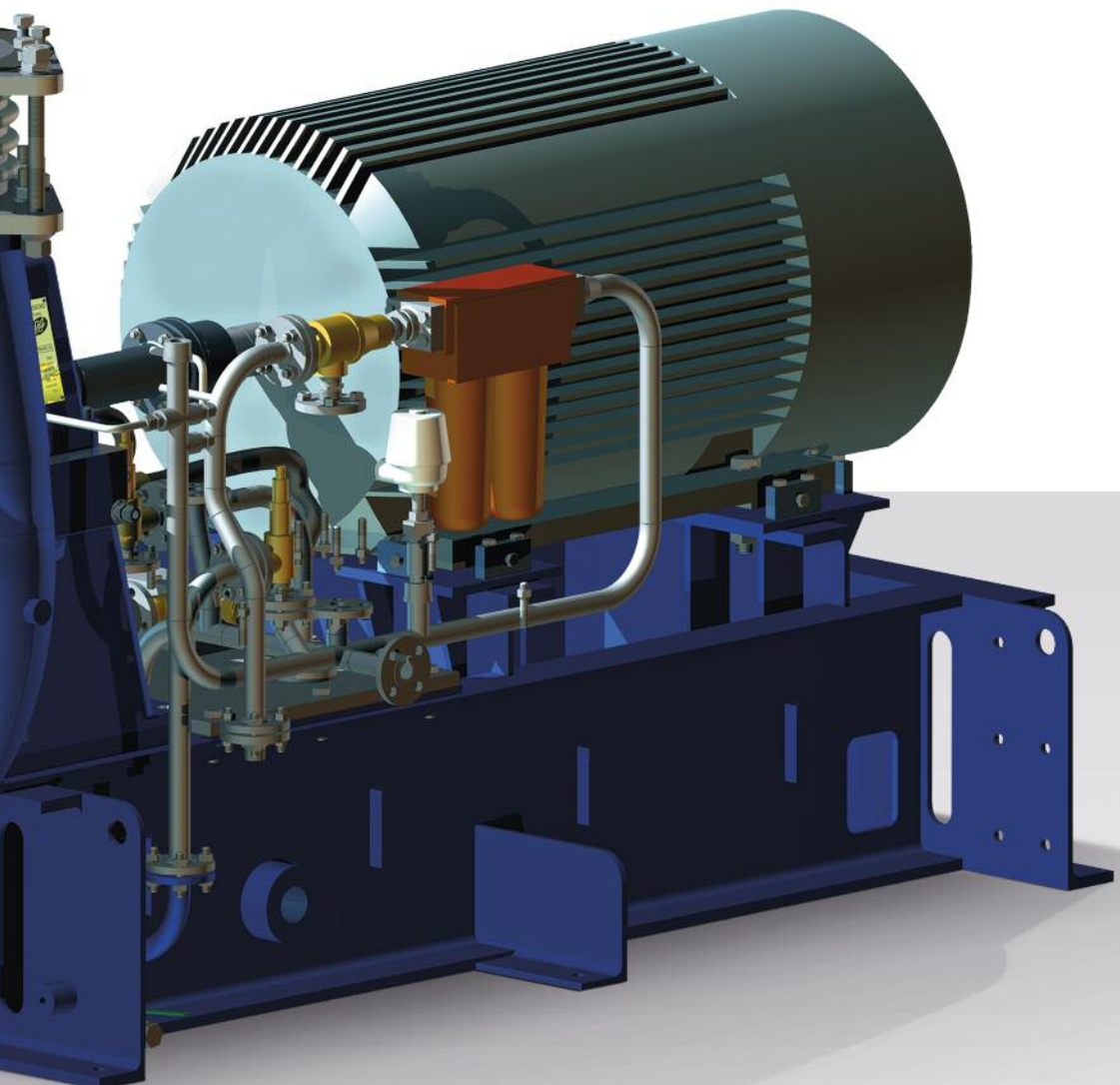


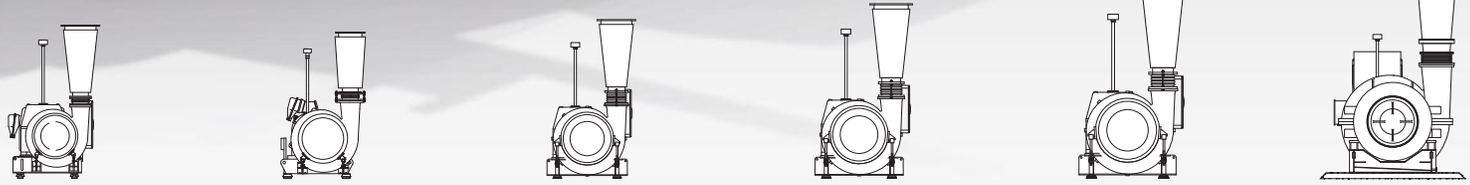


SG26 | SG30 | SG35 | SG40 | SG45 | SG52

TURBO COMPRESSOR SYSTEM WITH ANCILLARY EQUIPMENT







SG60 | SG65 | SG70 | SG80 | SG92 | SG105

RESPONSIVE INTEGRATED TECHNOLOGY

DESIGNING AND SPECIFYING A MODERN, ENERGY-EFFICIENT AERATION SYSTEM IS A COMPLEX TASK, DEMANDING DETAILED KNOWLEDGE OF THE COMPRESSION PROCESS AS WELL AS THE OPERATION AND CONTROL OF THE AIR DISTRIBUTION SYSTEM, AND A THOROUGH UNDERSTANDING OF THE ACTIVE SLUDGE WATER TREATMENT PROCESS.

PROVEN EFFICIENCY

Howden turbo compressors high efficiency systems have been thoroughly researched and tested to provide flexibility and control even when plant conditions require greatly reduced capacity. Our figures relate directly to the working efficiency of our turbo compressors once installed and running. They will be reflected in genuine energy savings.

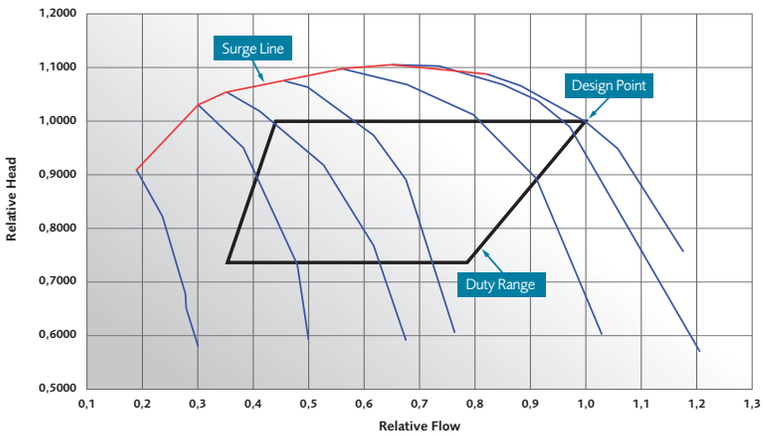
All compressors, whether they use rotary lobe compressor (positive displacement), multi stage centrifugal compressor or turbo compressor technology, are designed to work at peak efficiency when they are running at full capacity.

When the capacity drops to normal operating levels, however, the efficiency may fall away dramatically. Of the three technologies turbo compressors are the most efficient, approaching 87% efficiency at full capacity.

Howden turbo compressors, with their inlet guide vanes, variable vaned diffusers and enhanced impeller design, have a clearly measurable advantage in maintaining excellent performance in the full operating range of 45-100% capacity. Howden turbo compressors excel where plant conditions dictate that compressors operate away from the design point, giving significant operational benefits.

PERFORMANCE CURVES

TURNDOWN AND RISE TO SURGE

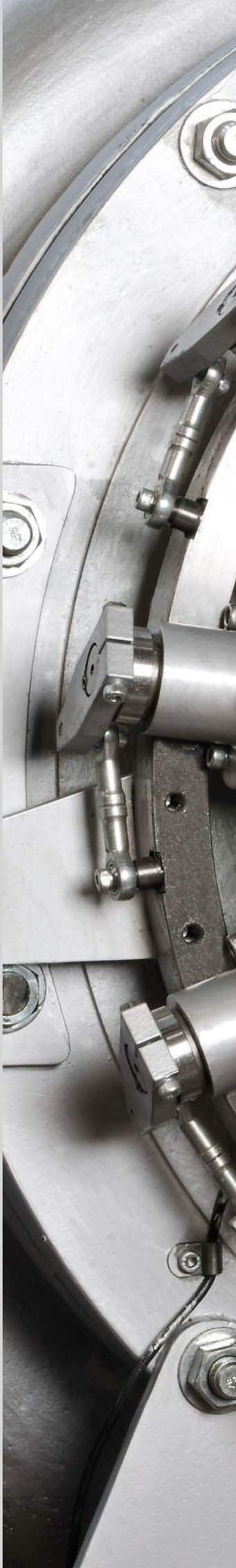


VARIABLE VANE DIFFUSER

The Howden variable vane diffuser system is designed to be easy to access for service and maintenance to minimise down time.

IMPELLER

Howden's third generation impeller is a core 3D high performance impeller designed for maximum efficiency and a severe downturn capability. By maintaining performance at operating levels far from the surge line, it provides maximum operating stability. The S-shaped impeller has strong backward leaning blades and every second blade in the inducer is cut back to avoid blockages in the inducer section. This unique aerodynamic design offers our clients maximum efficiency across the full duty range. It also gives a head stability margin of 8-10% from maximum duty head to surge, thus lowering vulnerability to ambient changes and reducing down time.



HOWDEN WATER TECHNOLOGY

IS AN INVALUABLE SOURCE OF APPLICATION EXPERTISE AS WELL AS A SUPPLIER OF COMPLETE, INTEGRATED AIR SUPPLY SYSTEMS

PREDICTING REAL PERFORMANCE

The understanding that no two plants will ever operate in exactly the same conditions, and our certainty that we can deliver efficiencies and energy savings, led us to the development our unique modelling software.

This compares different types of air supply technology within the precise parameters of the customer's own plant. Alongside the volume and pressure of air required, there are many other factors which affect operation. We factor in the time the plant runs at full, high average, low average and minimum capacity, and add ambient conditions like relative humidity and temperature, and variables like energy availability and cost, using figures supplied by the customer.

Allowance can be made for energy price rises and maintenance over a 20-year operating period. The software is designed to precisely mirror genuine working duties and ambient conditions, and will analyse retrofits and upgrades as well as new installations. It gives an invaluable insight into savings over the equipment's planned life.

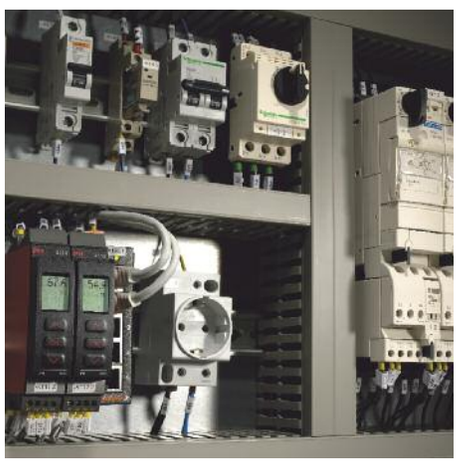
EFFECTIVE CONTROL

HOWDEN WATER TECHNOLOGY'S STRENGTH LIES IN OUR COMPREHENSIVE UNDERSTANDING OF THE APPLICATION. WE BRING TOGETHER EXPERTISE IN COMPRESSOR TECHNOLOGY, DISTRIBUTED CONTROL TECHNOLOGY AND THE DOWNSTREAM AERATION PROCESS FOR WASTE WATER TREATMENT TO OFFER OUR CLIENTS THE VERY BEST TECHNICAL SUPPORT.

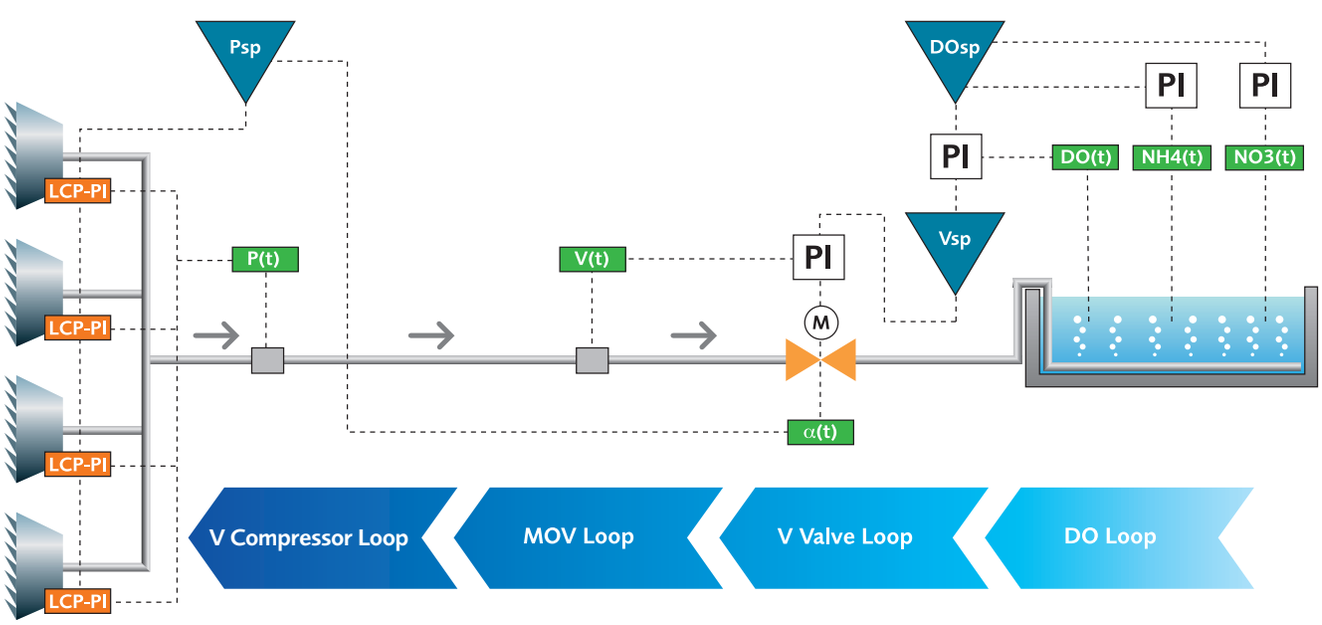
Today, single stage geared turbo compressors are the most efficient way to aerate treatment plants. The technology has been brought to an extremely advanced level, and the focus is now on highly efficient controls and downstream solutions that will make the overall air supply system of even higher value to the end user. The aim is to constantly offer the client the optimum solution and the lowest cost of ownership.

To ensure that the aeration system is always making the most effective and appropriate use of all the compressors, and thus running as efficiently as possible, Howden Water Technology offers a reliable load sharing system called Airflow Integrated Management (AIM). Incorporated into the Local Control Panels, the system provides several advantages.

- By integrating master and local control in one panel, it removes the need for a separate Master Control Panel and so removes the potential for faults arising in a separate Programmable Logic Controller.
- It maximises energy savings through the use of the Most Open Valve principle, an approach designed to prevent the compressors wasting energy by creating more pressure drop in the control valves than the plant needs at the time.
- It reduces the need for starting and stopping of the compressors, and reduces down time.
- The integral Air Compressor Duty Hour Equalising feature ensures that duty hours are shared evenly across all compressors.



BIOACTIVE RESPONSE SYSTEM (BARS)



HWT's BioActive Response System combines the energy efficient AIM system with a downstream air distribution system in which four control loops interact in real time to produce the minimum air flow required to efficiently treat the water in the Aeration Tanks. By constantly maintaining the lowest possible Main Header air pressure, BARS prevents unnecessary energy consumption and reduces running costs.

The first control loop sets the dissolved oxygen level set-point based on readings of the ammonium and nitrate levels in the water. The second loop uses the dissolved oxygen level deviation from the DOL set-point as basis for setting the air flow set-point of the air control valves. The third loop sets the main header pressure set-point based on readings of the most open control valve position and finally the fourth loop controls the air flow discharged from the on-line compressors keeping a constant main header pressure.

Howden Water Technology can provide all the necessary hardware and software, and supply the complete control system. As well as maximising efficient running and thus lowers energy costs, this gives the customer the advantage of dealing with a single supplier.

BARS also allows plant operators to build in a range of special programme features to respond automatically when normal plant operating conditions are breached. Dedicated programmes can also be built in for procedures like normal start-up, tank cleaning and backwash filter cleaning, and special routines can be included to handle situations such as start-ups where there may be water in the pipes (leading to danger of surge) or storm water influx where high air throughput is required for a short time.

FULL LIFETIME SUPPORT

EVERY TURBO COMPRESSOR WE SUPPLY, AND ALL OF ITS ASSOCIATED CONTROL AND SOFTWARE SYSTEMS, IS BACKED BY AN UNEQUIVOCAL COMMITMENT TO LIFETIME SUPPORT. HOWDEN'S GLOBAL NETWORK OF QUALIFIED SPECIALIST ENGINEERS MEANS THAT WE CAN OFFER A FAST LOCAL RESPONSE VIRTUALLY ANYWHERE IN THE WORLD WHEN REQUIRED.

We maintain a full spares programme based on meticulous documentation of the equipment we originally installed, so that every part we supply is manufactured to specification. More importantly, our records are a valuable resource that allows us to provide reliable advice rapidly when plant conditions may change or other factors such as technological developments may make retrofits or upgrades advisable.

RAPID RESPONSE

We are happy to discuss any aspect of water aeration technology, from consultation as systems provider at the planning stage to advising on possible retrofits and modernization of existing plant irrespective of age, location or original supplier. Our modeling software can provide a wealth of hard information to assist decisions about the timing and scope of plant modernisation. And because we are focused solely on the needs of the industry we operate 24/7 for our clients.

Howden, founded in 1854, is the world's leading supplier of fans, compressors and rotary regenerative heat exchangers for a large range of industrial applications. Whether pre-engineered or custom built for a specific application, our products are known throughout the world for their high levels of performance, reliability and innovation.

The combination of our product knowledge with our extensive applications experience, gained by our engineers on sites throughout the world, allows us to provide our customers with support from the initial project inception right through to the end of the plant life.

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