Sabroe AP1200 + WDO1200 purging system

Keep your system clean and save money

The power behind **your mission**

Johnson Controls

New feature:

Controller with signal of water content and purged air timer

Purpose of the combined air and water purger

The very powerful AP1200 + WDO1200, a combined air and water purging system can handle all sizes of industrial refrigeration systems that use ammonia (R717) as refrigerant and ensure no air, water and other impurities are left in the system.

The AP1200 + WDO1200 purging system uses excess thermal energy from the air purger to also remove any water, dirt or oil (WDO) that might be present in an ammonia refrigerant charge.

This enables you to tackle multiple refrigerant contamination problems at once, with relatively low costs.

Installing an AP1200 + WDO1200 unit means you reap the full benefits of clean ammonia with consistent specifications for use at the heart of your refrigeration systems.

This whole purging system is easy and cheap to install, operate, and service.

It is also ideal as a low-cost, energy-effective way to boost operating efficiency as well as to avoid and prevent unpleasant surprises, service interruptions, and possible breakdowns in your key processes.

Check profitability

Use the table below: to calculate whether it is profitable for you to buy a purging system

Value	Description	Unit	Example	Your refrigeration plant
A	Compressor power consumption	kW	200	
B	Annual operating hours	h	5,000	
C	Power expenses	Euro/kWh	0.15	
D	Air/Water contamination	Deg. C / %	2 / 4	
E = A x B x C	Annual compressor power expenses	Euro	150,000	
F = E x D x 0.02	Additional annual expenses on compressor due to air/water contamination	Euro	18,000	
G	Investment purging system	Euro	29,000	
H = G / F	Payback time	Years	1.6	

Advantages	Benefits
Amount of purged air can be determined from controller with purge timer and capacity table	Normally reduces refrigeration equipment energy consumption by as much as 5-10%
Relation between air and water content in the system becomes visible	Reduces operating costs and keeps the refrigeration system and its components operating at maximum efficiency
Helps prevent undesirable chemical reactions in all systems in a refrigeration installation	More stable operation as well as lower service and maintenance costs
Warning signals when ready for pump down and water drainage from controller	Fewer oil changes needed, improved operating efficiency and longer service life for equipment and installations
Low installation costs as AP1200 + WDO1200 can use the same connections	Easy and cheap to install, operate and service

AP1200

The AP1200 is specially designed to maintain the efficiency of an ammonia refrigeration system by removing any air present in the refrigerant charge

Removing the air makes it possible to reduce system costs as well as limit any risk of unintended operation errors and unscheduled downtime. Any air present in the system will influence the effective surface of both condenser and evaporators, which will result in higher operating cost due to increased energy consumption and premature wear of compressor parts. Air in the system will impact the running conditions, with general rules of thumb outlined below.

Condensing temperature

A 1°C increase means approximately:

- 1 percent lower cooling capacity
- 3 percent lower COP
- 3 percent higher power consumption

This provides a quick overview of the consequences of an increased condensing temperature caused by the presence of air in the refrigerant.

Evaporating temperature

A 1°C decrease has a range of effects, as shown below:

At	Capacity	COP	Power
+10°C	-3.6%	-5.0%	+5.2%
0°C	-4.0%	-4.3%	+4.5%
-10°C	-4.4%	-3.8%	+4.0%
-20°C	-5.1%	-3.5%	+3.6%
-30°C	-5.5%	-3.9%	+4.1%
-40°C	-6.5%	-4.4%	+4.6%
-50°C	-7.3%	-5.0%	+5.2%

This table shows the effect of lowering the suction temperature by a single °C to compensate for the reduced effect caused by air in the system.

The AP1200 works automatically when connected to controller.

Amount of purged air can be determined from controller with purge timer and capacity table.

This makes sure that the pressure inside is high enough and the temperature low enough for the ammonia gas in the inner chamber to condense.

When the air purger is filled with non-condensable gas, the controller opens the air purge connection and releases air until a high liquid level is restored. It then closes the air purge connection again.

Both vessels AP1000 and WDO1200 are made in stainless steel.


Effectively removes
air, water and other
contaminations
from your system

WDO1200

Effects of water on ammonia plant

The WDO1200 is specially designed to remove water contamination and bring down the oil and dirt content in the refrigerant. This reduces both the operation costs of the customer's plant and the risk of unintended shutdown.

There are three causes of higher operating costs as a result of water in ammonia refrigeration plants:

- **Increased power consumption** – When water mixes with ammonia, the compressor is required to keep a lower evaporation pressure to compensate. Doing this requires higher power consumption. Generally speaking, power consumption increases by 2 percent for each percent of water in ammonia.
- **Increased oil consumption** – Oil is broken down by the formation of nitro-compounds when water and oxygen are present in the system. This results in the need to change oil more often than if water were not present.
- **Increased maintenance costs** – Water mixing with ammonia results in the formation of ammonium hydroxide that, if present in a system, causes the corrosion of valves and pipes (especially if oil is not present). Consequently, maintenance costs increase.

The WDO1200 works automatically, but requires manual draining of the sludge and water reservoir when it is full.

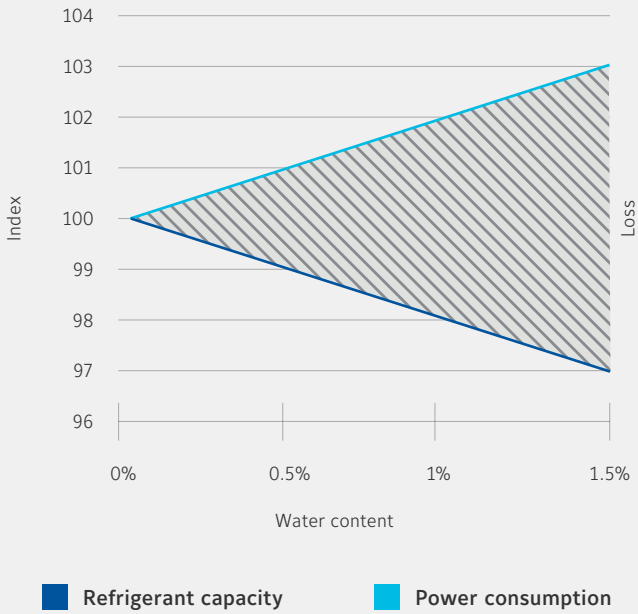
A WDO unit evaporates – and thus purifies – the liquid ammonia by exploiting the refrigerant's particular properties, pressure and temperature, with no additional energy inputs needed. The ammonia evaporates before water, leaving dirt, oil and other contaminants to settle in the sludge reservoir.

When the controller display shows the alarm **Pump down necessary**, it means that the water percentage is higher than the set point 40%.

The WDO1200 then holds back the water dissolved in the liquid ammonia.

When the controller display shows the alarm **Emptying necessary**, it means that the water reservoir temperature is higher than the evaporation temperature (approx. 12°C) and the water must be drained off. This is also a manual operation.

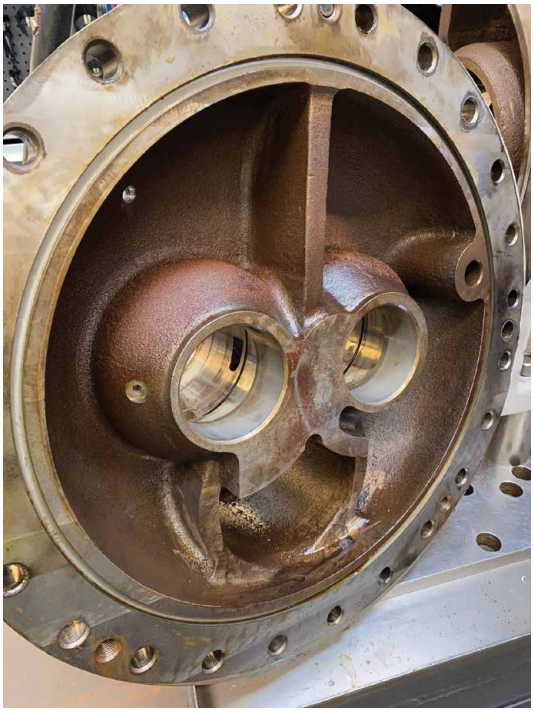
Effects of water contamination



Water, dirt and oil is drained from WDO1200.

Expertise makes a difference

AfterMarket Solutions (AMS) has a mission to be your preferred partner in re-manufacturing, overhaul, and retrofit projects.





At Reman work shop, 25% of the compressor overhauls shows water contamination.

Need a solution?

We work on and welcome all types of compressors. Our entire staff takes great pride in ensuring your plant suffers minimal downtime by entirely exchanging your defective compressor, or overhauling it and returning it, in a timely manner. To provide further service to you as our customer, we also offer air purgers and system cleaners compatible with ammonia plants.

The Johnson Controls compressor block exchange programme enables customers to avoid the downtime and inconvenience associated with on-site overhaul by sourcing a replacement block directly from our ready-for-sale stocks.

Retrofit

We can now provide a retrofit programme that offers customers the chance to buy a new compressor block to be mounted on an existing unit. This will drastically reduce maintenance costs and shorten lead times.

On your terms

The Johnson Controls AMS exchange and overhaul programmes are planned and configured to make sure customers can keep their Sabroe, Stal, Gram and Frick compressor equipment operating at peak efficiency for an exceptionally long time. Any exchange or repair work can be carried out on the customer's terms, planned to take place at the most convenient time, and with the absolute minimum of operating disruption.

Johnson Controls Industrial Refrigeration

Leading the world forward to great new opportunities

So many things in our lives rely on refrigeration. This is why we are dedicated to providing the world with the industrial refrigeration, energy recovery, and gas compression technology required today and tomorrow.

Our industrial refrigeration products allow the food industry to deliver fresh food to consumers by providing essential equipment for processing and distribution. We also supply many of the unique products required to move gas through pipelines, to recover and transfer energy, and to manufacture chemicals, pharmaceuticals and other products that are needed for the everyday items we depend on.

Refrigeration processes are often required to operate 24 hours a day and, with operational lifetimes of 25 years or more, reliable service and support is an essential part of our commitment to our products.

Key to the provision of refrigeration services to our customers is the efficient supply of reliable and long-lasting Sabroe parts, thereby reducing downtime and the overall cost of machine maintenance. Making the most of our effective worldwide logistics infrastructure and rapid response inventory management, the Parts Centre dispatches any part that is in stock to wherever it is needed, worldwide, within just 24 hours.

We provide all kinds of services related to the following brands:

SABROE Frick Gram Refrigeration STAL REFRIGERATION YORK

Customer benefits

Global reach

Our global service and parts network ensures customers are being served by an organisation with a global reach that is also known and active at the local level.

Improvements

To continually improve the value we provide to customers, we strive to become more competitive and capture new opportunities.

Innovation

We believe there is always a better way. This belief inspires us to develop new solutions, options and opportunities, which we pass on to our customers.

Customer satisfaction

Our 100,000 global colleagues strive to serve our customers in the best way – customer focus is our key to success.

Sustainability

We believe that sustainability will play a significant role in any future development of our products, services and operations. Our focus will be on efficiency and environmental protection.

Quality

We will distinguish ourselves with our customers through the exceptional quality of our products and services.

About Johnson Controls

At Johnson Controls, we transform the environments where people live, work, learn and play. From optimizing building performance to improving safety and enhancing comfort, we drive the outcomes that matter most. We deliver our promise in industries such as healthcare, education, data centers, and manufacturing. With a global team of over 100,000 experts in more than 150 countries and over 135 years of innovation experience, we are the power behind our customers' mission. Our leading portfolio of building technology and solutions includes some of the most trusted names in the industry, such as Tyco®, YORK®, Metasys®, Ruskin®, Titus®, Frick®, PENN®, Sabroe®, Simplex® and Grinnell®.

For more information, visit **www.johnsoncontrols.com** or follow **@johnsoncontrols** on Twitter.

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