

ELIVAC®



***SMART VACUUM SYSTEM
SAVES 80% ENERGY***

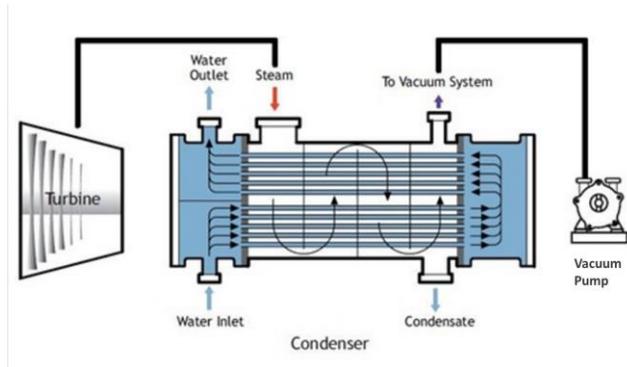


IN CONDENSER POWER PLANTS

An International Brand with Proven Swiss Quality

Traditional Vacuum System in a Condenser Power Plant

To maximize efficiency in a steam-turbine power plant, the condenser works under vacuum. If the vacuum level is not well maintained, each generated kWh will consume more fuel. No matter how well the condenser is built and maintained, there is always air leaking into the system. If the leakage air flow increases, the vacuum level in the condenser will deteriorate. A vacuum system to suck out the air is therefore installed at all condensers. Like the condenser system itself, it has to work on a 24/7 basis.

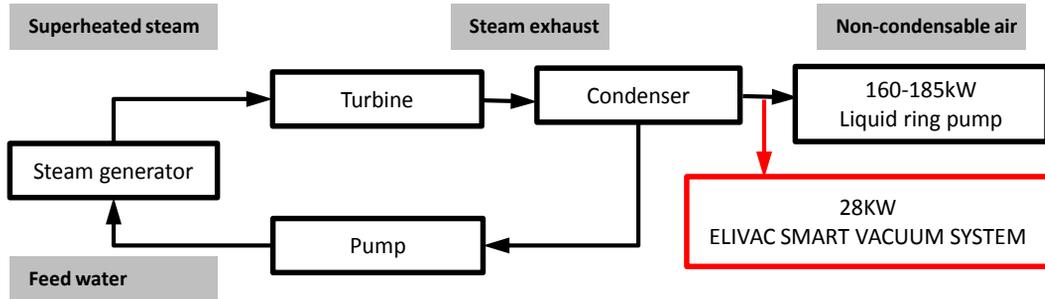


Vacuum pumps for steam condensers traditionally consist of steam ejectors or liquid ring pumps

How Can the Patented ELIVAC Smart Vacuum System Save 80% Energy?

An ELIVAC energy saving system is designed to substitute the large LRP with only 1/6 energy consumption during 99% of the time, except for the starting time. The reasons for reduction of electric energy consumption are four-fold:

1. Two-stage Roots pumps are dry pumps with much higher efficiency than that of LRPs;
2. ELIVAC twin-lobe Roots pump has the highest internal volume displacement efficiency among all pumps;
3. The combination of ELIVAC two-stage Roots pumps + two-stage LRP (actually a 4 stage system) is the most efficient set up so far among all solutions;
4. The system is a smart, PLC-controlled and VF motor driven one based on actual need!



Given the same vacuum level, the smart ELIVAC system turns into a constantly working pump and the LRP into a start and stand-by pump



Large, thermal power plant condenser



Two operating and two stand-by LRP for condensers

Full Vacuum Solutions for Condenser Power Plants

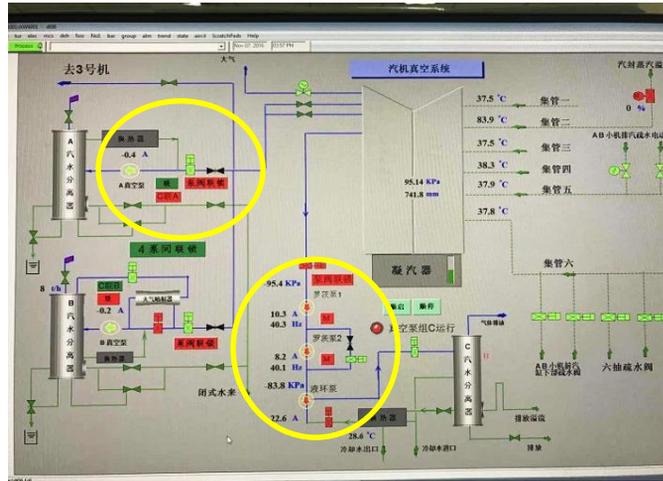
ELIVAC offers 300 MW, 500 MW, 600 MW and 1000 MW standardized smart energy saving vacuum systems as well as customized systems for any thermal power plant and industry. ELIVAC can of course also offer the main LRPs for the condensers for new plants and for old plant system replacement. ELIVAC offers only the double-stage LRP that can save 20-30 % electric energy as compared with the single-stage pump. Therefore, ELIVAC can offer optimized both main starting LRP and the smart energy saving vacuum system.



ELIVAC ELRC 3500 with a pumping speed of 3500m³/h



Large LRP current before change over



Large LRP turns off and Smart Vacuum Pumps started

600 MW Reference Case at China Shenhua Group, PRC

Similarly, the 600 MW power plant needs a larger ELIVAC smart vacuum system to replace its large two-running and one back-up LRP system. While the power plant is already equipped with the large, highly efficient two-stage LRPs, the smart vacuum pump system's saving potential is still about 70%.



ELIVAC smart vacuum system ESRL600 and the large, original, two-running, two back-up liquid ring vacuum system

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ELIVAC smart vacuum system: ABB frequency control units, Siemens variable control motor, SKF seals, NSK bearings, Rosemount sensors, CE certified ELIVAC Roots booster pumps, two-stage LRP (optional full stainless steel LRP) and control boxes. At the same motor rating, the two-stage LRP has significantly higher suction speed than has a single-stage LRP in the applicable vacuum pressure range.



With a much lower energy consumption, the ELIVAC smart vacuum system is designed for a significantly higher pumping speed than that of the original large LRP system. Therefore, and very critical for fuel efficiency, it maintains the same or better vacuum level in the condenser than does the large LRP system.

1000 MW Reference Case at China Huaneng Group, PRC

Huaneng Group is one of the biggest power-plant groups in the world. The picture below is from their control room.



A larger generator may be more likely to require two separate ELIVAC smart vacuum systems to individually support the two large condensers. However, it is customer's choice. There are always some specific differences among condensers so detailed discussions, accurate calculations and sufficient spare capacity are very important. A poorly designed, cheap system cannot hold a reliable condenser vacuum.



ELIVAC ESRL500-1000 smart vacuum system on site

Other ELIVAC Energy Saving Systems - Industrial Applications



Mechanical pump replaces steam vacuum system for steel refining and reduces 90% of energy and water



Dry screw vacuum pumps with smart control reduces 50% energy and 100% water



Gas vapor recovery



Reduces 40% energy for solar panel



Reduces 60% energy for drying



Reduces 80% energy in edible oil production



Reduces 53% energy in tobacco process



ELIVAC Swiss GmbH
Haldenweg 2, CH-6382 Büren, Switzerland

Mob: +41 78 641 33 32 Tel.: +41 41 628 00 75

info@elivac.ch

<http://www.elivac.ch>

