



DRYVAC PowerBoost

The new intelligence
of pumping



Meet our intelligent DRYVAC PowerBoost and PowerBoost Plus systems: Less equipment, more performance.

Time for more intelligent pumping with PowerBoost

Like world-class sprinters, vacuum pumps often need to deliver powerful bursts of energy on demand. For applications like load lock for inline coaters, those peaks are traditionally covered by connecting several, less powerful pumps and running them at a constant speed – even during idle times. But what if load locks for inline coaters in the architectural glass, solar, display and other markets, could be made more efficient thanks to fewer, more powerful pumps that “knew” when to run hard and when to save energy? That, in a nutshell, is what motivated Leybold to create the world’s first intelligent vacuum pump: the DRYVAC PowerBoost system.

System Control (DRYVAC SYSTEMS based)

- Monitoring of vital functions
- Easy system control
- Highest reliability
- NORE Technology (Noise Reduction Technology)
- Autodetection cycle time

RUVAC WHU4400

- new bypass valve, pressure relief for high pressure peaks, such as shock venting
- with new motor and variable frequency drive
- Integrated gearbox evacuation, based on WHU2500



DRYVAC SYSTEMS based design

- Electronic layout
- Mechanical layout
- Customer interfaces

DRYVAC 650S

- optional with triple purge or double purge and gas-ballast
- optional with non-return valve

Braking resistor

- water cooled

Benchmark in performance

The intelligent PowerBoost solution features adaptive self-monitoring. It automatically detects each previous pump-down cycle and calculates the maximum power available for the quickest pump down in the current cycle. The result is unparalleled performance, cycle after cycle. DRYVAC PowerBoost solutions offers 1.5 up to 2.7 times more suction speed than previous generations of pump-down systems.

Best efficiency

PowerBoost also uses automatically detected cycle data to adjust the pump's performance for maximal efficiency. Parameters such as speed and power consumption are adapted to individual applications and operating conditions. Plus, PowerBoost requires no extra effort, so users can enjoy the benefits of plug-and-play convenience.

Lower noise level

PowerBoost is an exceptionally quiet solution. The pump detects cycle times and slows down the roots blower before each cycle to reduce unnecessary noise.

Reduced costs for investment and ownership

PowerBoost makes it possible to do more with less. Much more. Because when fewer pumps are required for the same job, that means real savings. Including less money spent on wiring and utilities. Get ready to enjoy plenty of extra space in your fab – and the new possibilities that it brings.

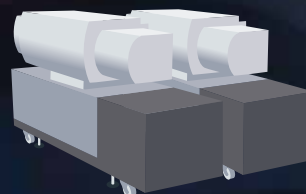


The DRYVAC PowerBoost Solution:

Chamber volume:

600 l

Conventional system arrangement in load locks of inline coaters:



DRYVAC PowerBoost arrangement in load locks of inline coaters:



**DRYVAC PowerBoost
(DS 4465 U2)**

Why PowerBoost? Get the FAQs:

1. What's behind the new PowerBoost system?

PowerBoost and PowerBoost Plus are the latest members of the DRYVAC SYSTEMS platform from Leybold. The systems consist of a unique combination of a vacuum pump and a roots blower for controlled, intelligent high-speed vacuum.

2. Why intelligent pumping?

PowerBoost is the first ever intelligent pump system that understands its vacuum environment. The system automatically identifies the cycle time and reduces the rotational speed of the roots blower before the new pump-down cycle begins.

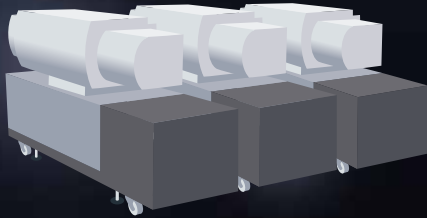
3. What are the advantages of intelligent pumping?

Intelligent cycle detection provides numerous advantages, most of all superior load lock performance, better energy efficiency, lower noise levels, and reduced cost of ownership.

4. What are some applications for DRYVAC PowerBoost systems?

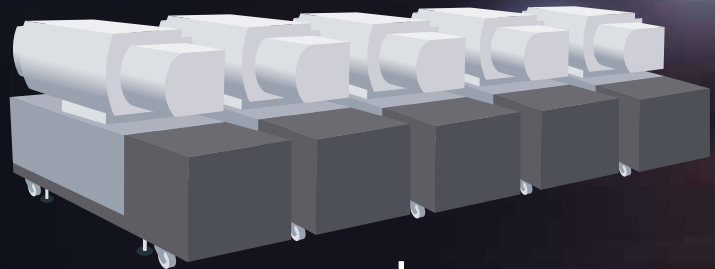
PowerBoost and Powerboost Plus are optimized for fast cycle applications and target pressures of $> 0,01$ mbar. These systems are suitable for all interval-based applications that require extremely high performance followed by idle periods. Autodetection of cycle times also makes them extremely flexible and adaptable to rotating products and variable conditions.

1000 l



**DRYVAC PowerBoost Plus
(DS 4465 U2+)**

2000 l



**3 x DRYVAC PowerBoost
(DS 4465 U2)**

DRYVAC PowerBoost – do more with less

PowerBoost solutions can reduce the number of side-by-side pumps required in production. Therefore PowerBoost setups are more cost effective than conventional pump setups at same performance levels, this advantage pays off right from the start.

PowerBoost means more power and more convenience

“Our PowerBoost systems let our customers do just that: boost their performance without adding equipment. In fact, they can do it with less. Plus, they’re incredibly convenient, easy to install and ready to use on delivery thanks to intelligent, self-adjusting functions.”

Ingo Kannen, Product Manager



DRYVAC PowerBoost: Intelligence within

Intelligent cycle detection is the key to understanding the power of our DRYVAC PowerBoost and PowerBoost Plus systems – and to unlocking their potential. Our systems operate, simply spoken, based on a two-zone model. Zone 1 is defined as pump down (high pump load), while zone 2 is seen as idle (no pump load). For a fast pump down you need all the suction speed in zone 1. In zone 2 the pump is not really loaded (idle). DRYVAC PowerBoost automatically measures the zone ratio and “boost” its suction speed up to a factor of 2.7.

Why is it important?

Basically, if one DRYVAC PowerBoost set its suction speed higher than factor 2 in zone 1 you might save the invest of one conventional pump set.

The expected boost-percentage will be estimated in our, for you tailored, pump down simulation.

Here's a closer look at what happens in each zone

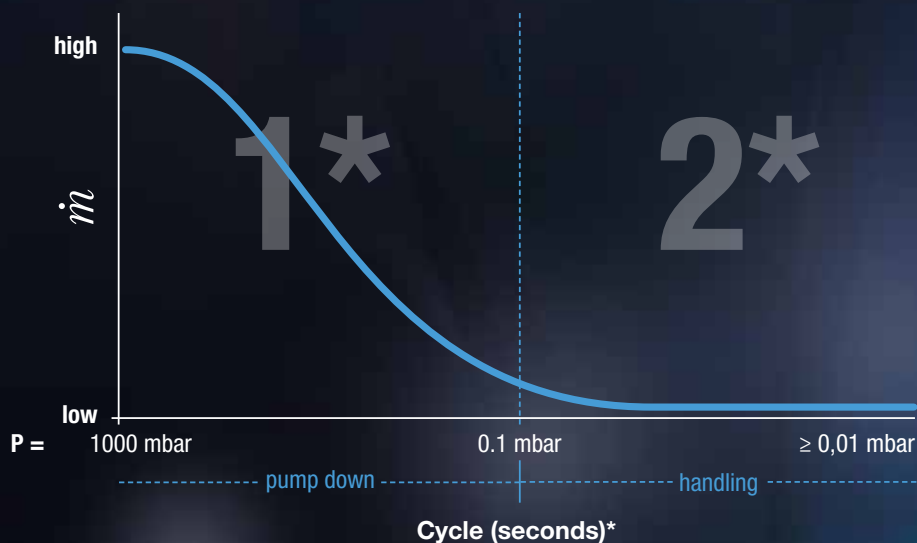
Zone 1

PowerBoost detects this zone by measuring the gas load. This zone is where you need maximum suction speed to pump down fast.

Zone 2

Your vacuum system automatically enters zone 2 as soon as you reach the target pressure (typically around 0.1 mbar). At that pressure level, the pump measured gas load is low and the pump will recover (cool down).

Intelligent cycle detection



* Cycle time could be 45s, 30s, 20s, 35s, ... etc.
P = Pressure in mbar
 \dot{m} = gas load

UP TO 30% TOTAL SAVINGS!

After the first cycle (sum of zone 1+2), DRYVAC PowerBoost automatically identified the zone's and "boost" the suction speed for the next pump down.

Boost-percentage calculation example

Given a pump down assumption of 10 seconds (zone 1), for a 40-second cycle (zone 1 + zone 2) we divide the pump-down time by the total cycle time:

$$\frac{\text{Zone 1}}{\text{Cycle}} = \frac{10 \text{ seconds}}{40 \text{ seconds}}$$

= 25% boost-percentage

DRYVAC PowerBoost will then automatically, based on 25% boost-percentage, set the maximum suction speed allowed based on mechanical, electrical and thermal limits.

Simplified correlation between boost-percentage and suction speed

- boost-percentage 25% = **factor 2 suction speed**
- boost-percentage 50% = **factor 1.5 suction speed**
- boost-percentage 70% = **factor 1.2 suction speed**

Smart pumping, smart results: Our PowerBoost series for efficient, connected, reliable performance.

| TECHNICAL DATA | | | |
|---|--|--------------------|-----------------|
| DRYVAC-SYSTEM | DS 4465 U2 | DS 4465 U2+ | Tolerance |
| Ultimate total pressure w/o purge gas or with purge gas for shaft seal outlet | $\leq 5 \times 10^{-3}$ mbar | | $\pm 10 \%$ |
| Maximum permissible inlet pressure | 1050 mbar | | |
| Maximum permissible discharge pressure (relative to ambient) | +200 mbar | | |
| Permissible ambient temperature | +5 ... +30 °C | | |
| Noise level with rigid exhaust pipe, at ult. pressure (acc. to DIN EN ISO 2151) | Screw = 65 dB(A) Roots = 63 dB(A) ⁵⁾ | | $K_{pA} = 3$ dB |
| Cooling | Water | | |
| Frequency | 50 / 60 Hz | | $\pm 5 \%$ |
| Phases | 3-ph | | |
| Rated power at 400 V | 57 kW | 72 kW (57 + 15 kW) | ± 0.8 kW |
| Rated current at 400 V | 95 A | 95 + 31 A | |
| Power consumption at ultimate pressure | 9 kW | 9 + 6.6 kW | ± 0.8 kW |
| Protection class | IP20 | | |
| Lubricant filling | LVO 210 | | |
| Intake flange | DN 250 ISO-K | | |
| Discharge flange | DN 63 ISO-K | | |
| Weight, approx. | 1500 kg | 1500 + 600 kg | |
| Dimensions (L x W x H) | 1744 x 677 x 1140 mm | 1744 x 1823 x 1140 | ± 10 mm |

| ORDER NUMBER(S): | |
|---|---|
| DS 4465 U2 | DS 4465 U2+ |
| 1 x DS1241iV01320 (DS 44HUF65S-IV) | 1 x DS1241iV01320 (DS 44HUF65S-IV) |
| 1 x 504613V902 (Harting Plugs for 100A) | 1 x 504613V902 (Harting Plugs for 100A) |
| 1 x 504406V901 (quick-action water counterparts) | 1 x 504595V901 (DV650 Plus upgrade kit) |
| | 1 x 112005A20 (Harting plug for 65A) |
| | 2 x 504406V901 (quick-action water counterparts) |

Note: Order numbers required for **one pump set**. Multiply numbers if you need more than 1 set.

PowerBoost and PowerBoost Plus are delivered with a full system enclosure and dedicated software. DRYVAC PowerBoost Plus solutions contain an additional DRYVAC 650 pump, which can be conveniently controlled via the main pump.



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Passionately applied.**

