

A large industrial machine for beer bottling, primarily white with black and silver components. It features a central section with multiple rollers and a large circular opening on the right side. The machine is set against a black background.

Leybold System for beer bottling

February 2024



Beer bottling – Typical vacuum system

- Most rotary bottling machines for beer are today equipped with **Liquid Ring Pumps**.
- This vacuum pump technology is quite robust and insensitive to liquid and foam ingress but.....:
 - They do not reach a very good vacuum level (at best 33 mbar with 15°C water)
 - Vacuum level and flow depend on water temperature (unstable performance)
 - They are subject to cavitation (possible downtimes)
 - They are not energy efficient (20-25% of the electricity is lost in the water ring!)
 - They need huge amount of water (often supply with fresh water)

→ It is a technology from the past!

- Liquid Ring Pumps are often provided in serial by bottling machine manufacturers as they are not very expensive....But they can generate a lot of hidden costs related to water (including disposal) and electricity consumption!
- Thanks to modern vacuum technology (dry pumps), Leybold can today help you to reduce these costs dramatically!



Why are our DRYVAC DV650/800 FP-r the BEST pumps for this process?

- Dry screw
 - ➔ ***Very robust, tolerate reasonable amount of foam/liquid (even be flushed for internal cleaning)***
- “COOL” pump: internal temperature (max 150°C at exhaust) prevents caramelization of sugars
 - ➔ ***No building of internal layers or pump blocking***
- Remote frequency converter, stainless steel silencer and triple layers epoxy painting makes
 - ➔ ***Suitable for wash down environment allowing installation at same location as LRP!***

Video washdown: [Dryvac in washdown](#)

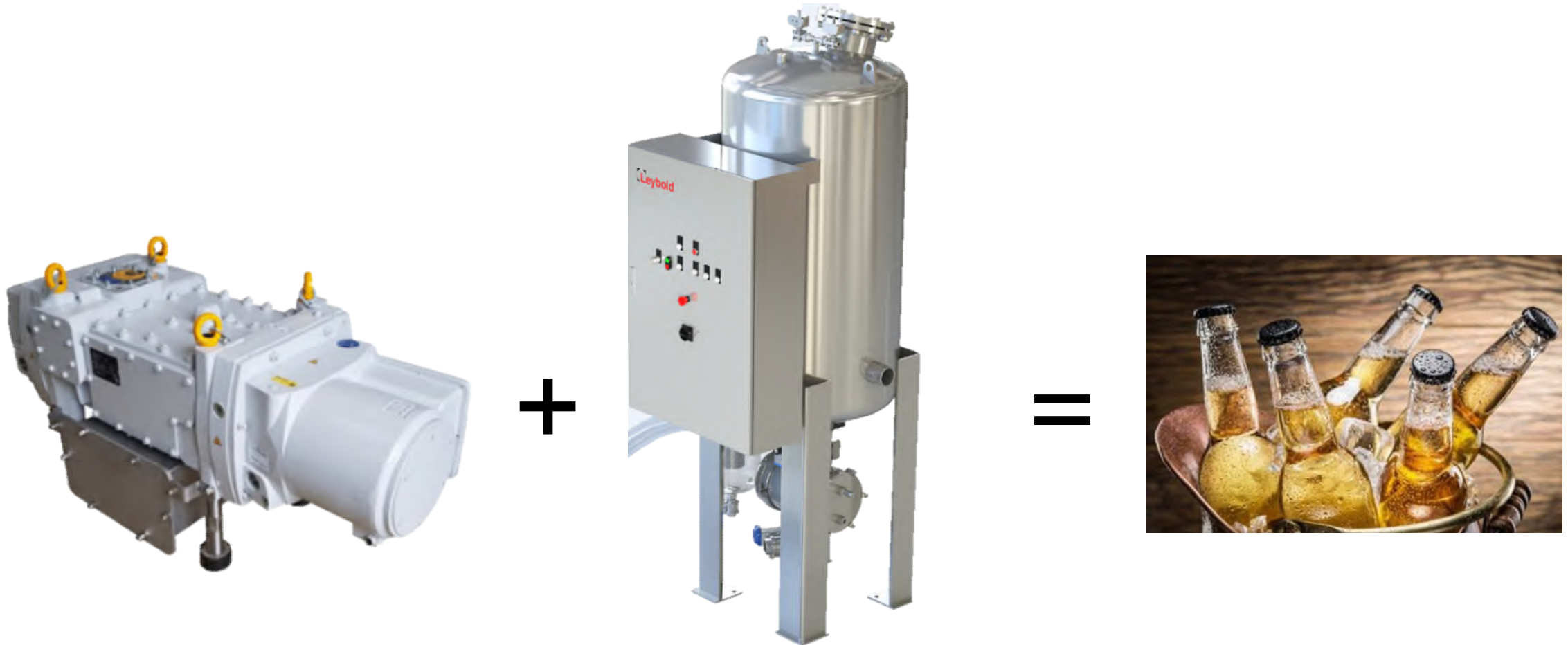
Video 10 l water ingress : [Robustness of Leybold's DRYVAC DV 650](#)



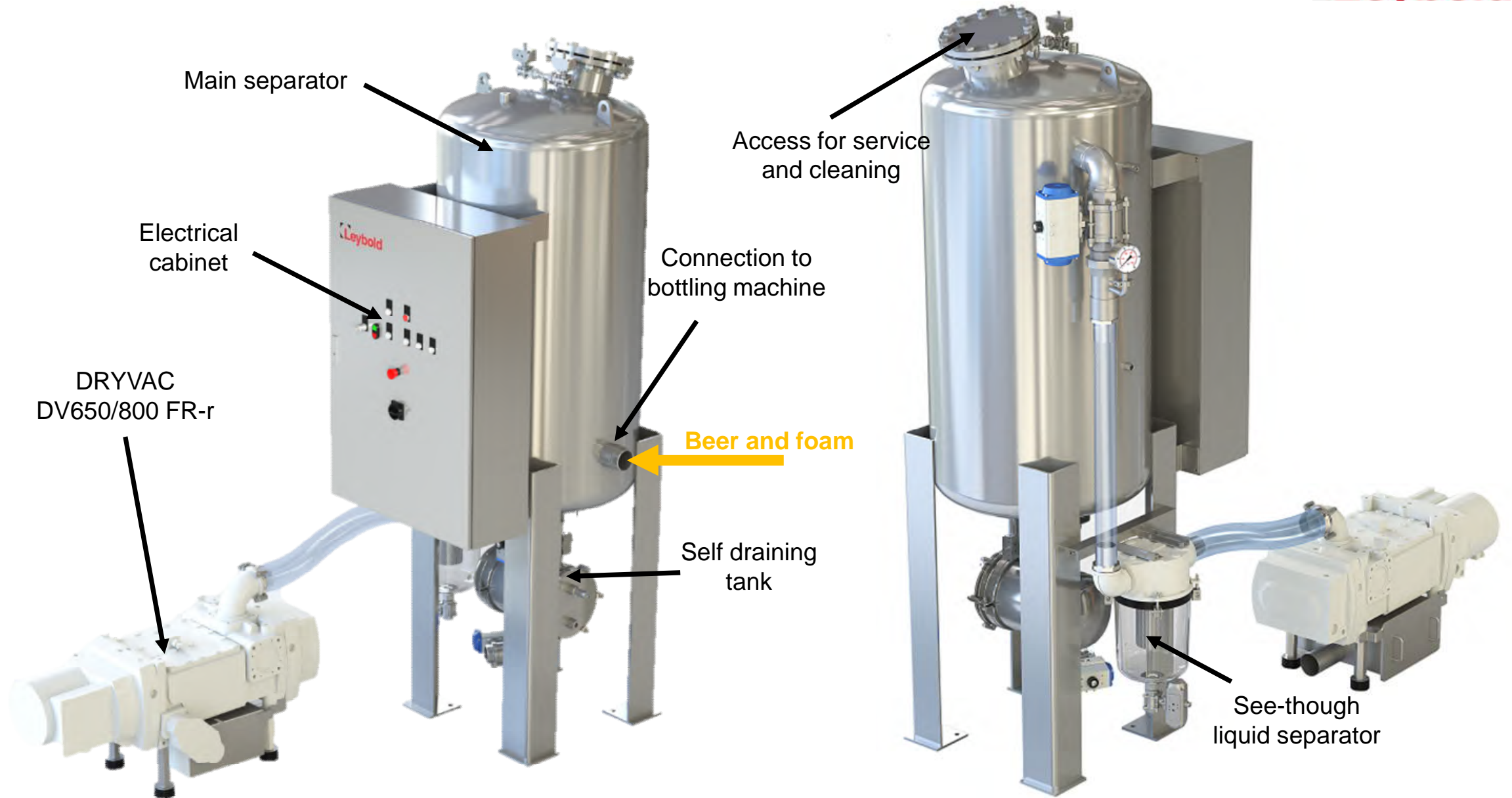
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- Our Beer Bottles Filling System is combining our dry screw vacuum pump **DRYVAC DV650 / 800 FP -r.....**
-with an **efficient inlet separation system** to stop the foam / beer before the pump.



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Main technical features

- Turnkey solution (1-to-1 replacement of LRP)
- Dry screw pump DRYVAC DV650 or 800 FP –r (depending on flow required), with hygienic design for installation in washdown environment (epoxy painting and stainless-steel silencer).
- Pump / valves / CIP cycle / drain system fully controlled by PLC
- Tank and vessel:
 - Separator, stainless steel 1.4301 or similar, diameter 800 mm
 - Draining vessel, approx. 22 liters, stainless steel 1.4301
- Valves – Housing and ball made of stainless steel
- Stainless steel enclosure (IP56) mounted on the foam separator hosting PLC, VFD and set of EM valves for purge gas.
- See-through separator between main separator and pump as last protection
- CIP (through CIP ball) for cleaning of the main separator and self draining tank
- Internal flushing of the pump at the end of production.
- Part numbers:
 - **400 V / 50 Hz : 505400V901 – BBVS with DV800**
 - **460V / 60 Hz : 505453V901 – BBVS with DV800**



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Self drained separator



CIP valves assembly

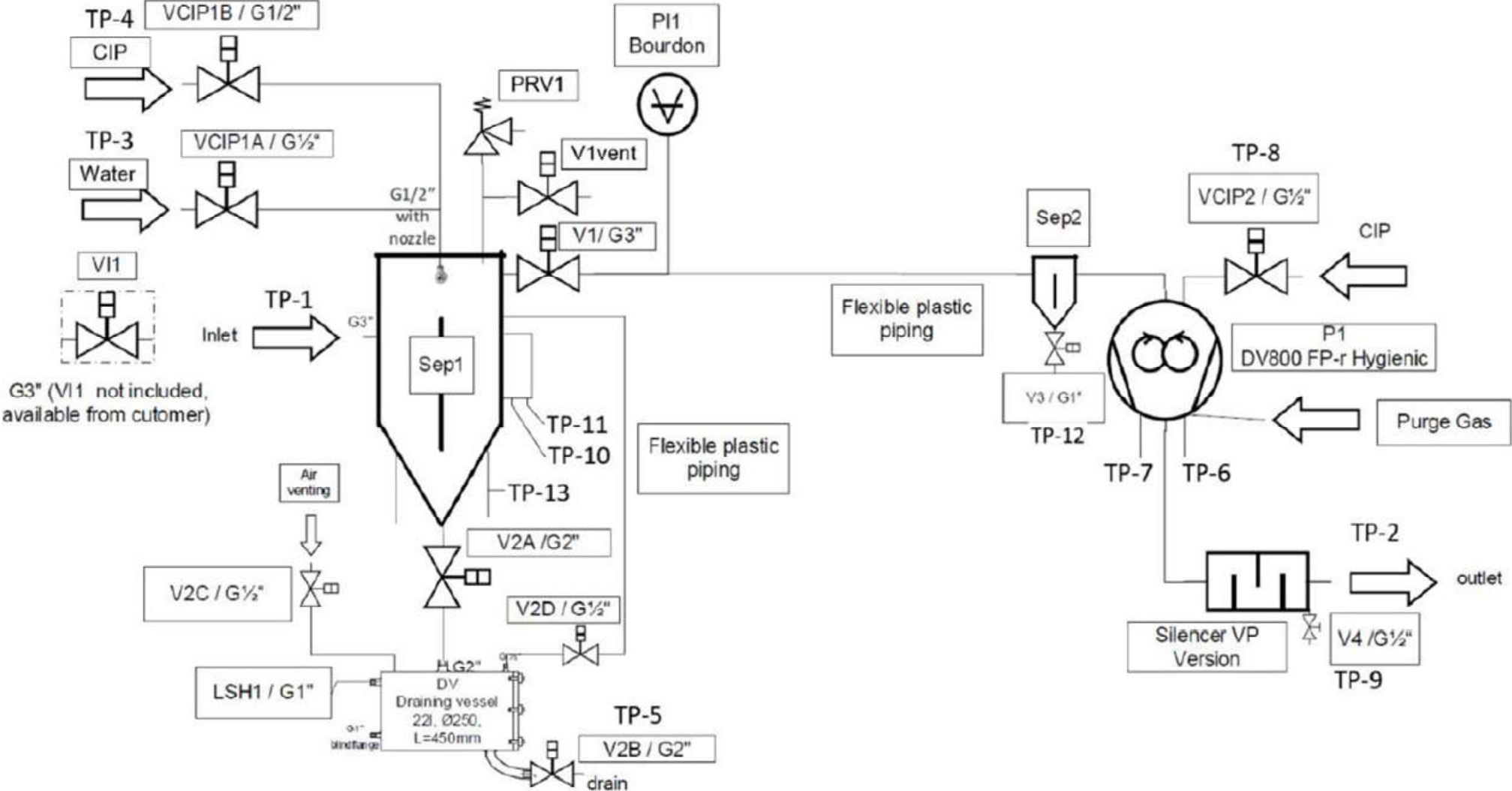
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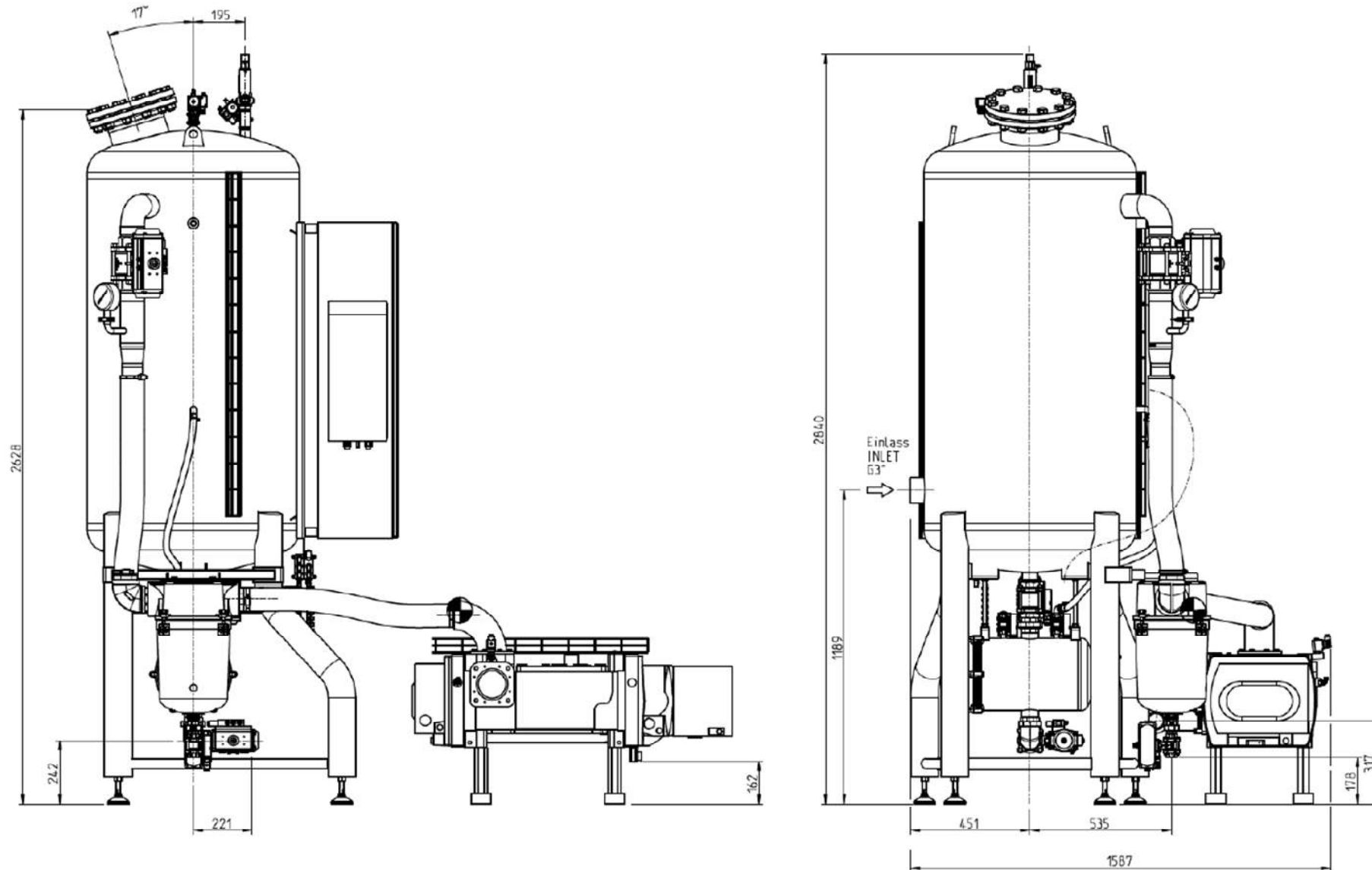


PID diagram



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Dimensional drawing (in mm)



Customer case study – Former liquid ring pump



- Customer : major player in the beer market with 170 breweries worldwide.
- Bottling machine capacity : 40,000 bottles/hour
- Liquid ring pump used: Robuschi RVS 23/TM/CT / Fresh water

Basic information:

- **Model:** RVS 23
- **Series:** Series RVS
- **Technology:** Liquid ring vacuum pumps

Parameters:

- Pumping speed: **500 m³/h**
- Max. vakuüm: **33 mbar**
- Wattage: **15 kW**
- Connection: **100**
- RPM: **1450**
- Weight: **195 kg**
- Size: **683 x 460 x 636 (l x w x h) mm**

		Pressione di aspirazione - Suction pressure								
		33 ÷ 200 mbar			200 ÷ 600 mbar			> 600 mbar		
Pompa Pump	Hz	LP	RP		LP	RP		LP	RP	
			5°C	10°C		5°C	10°C		5°C	10°C
23	50	2.00	1.00	0.70	1.80	1.00	0.70	1.50	0.88	0.63
	60	2.40	1.20	0.84	2.16	1.20	0.84	1.80	1.05	0.75

LP = Using fresh service liquid.

RP = Using mixed service liquid with temperature difference between fresh and recycled liquid of 5 and 10° C.

**Water consumption :
approx. 2 m3/h!**



Customer case study – CoO comparison

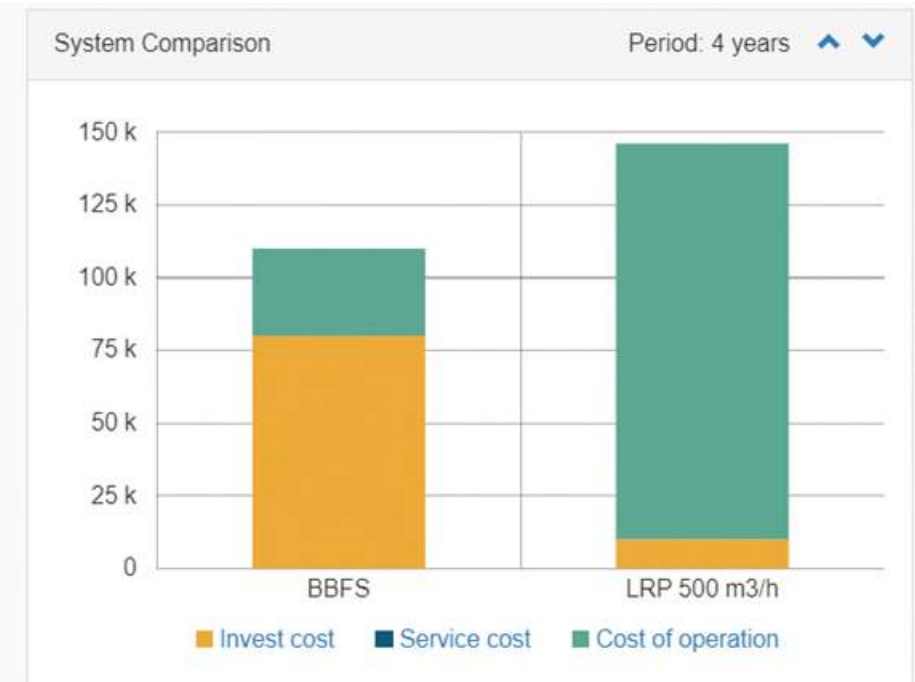
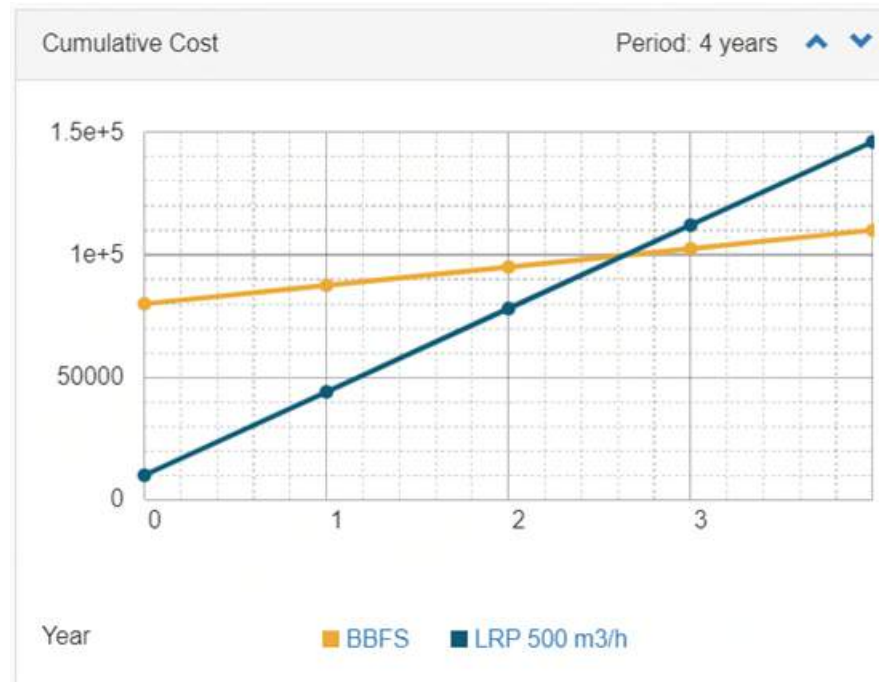
Operating time (hours per day)
- 16 +

Operating time (days per week)
- 6 +

Energy price / kW·h
0,15 €

Cooling water price / m³
2.5 €

Sealing gas price / m³
0,01 €



- <https://tools.leybold.com/next/app/coo/#/project/63d29534677cc3c8d44da0e3/>
- Considering 2 shifts operations (16 h/d – 6 days/week)
- (potential saving on CO2 not considered)
- Pay back between 2 and 3 years.

Customer case study – Leybold experience



Customer case study – Leybold experience



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- Benefits of using Leybold Beer Bottling Vacuum System:
 - No more pump downtime because of cavitation
 - No more (or dramatically reduced) water consumption
 - Cooling water of DV can be recirculated thanks to isolated circuit
 - Lower power consumption
 - Approx. 20% less electricity
 - Better pressure reached: lower total package O₂ level, decreased CO₂ consumption, improved bottling quality.

= Lower Cost of Ownership!



Thank you!

