

Energy-efficient pneumatic clamp with halved
compressed air consumption + CO₂ emission

With an efficiency of less than 3 %, compressed air is not only an inefficient but very costly medium. Therefore, wasting compressed air is equivalent to the “production“ of the climate killer CO₂.

This is exactly where the Eco-Clamp (eco = economic = efficient) ES 50 / 63 proves useful. The compressed-air-saving clamp provides for drastically reduced air consumption due to enhanced energy efficiency.

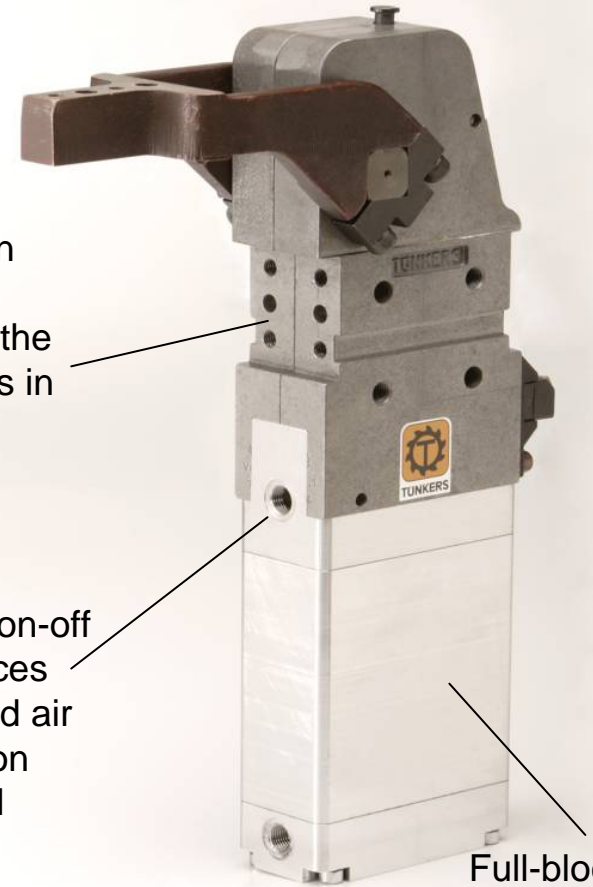
The Eco-Clamp ES 63

The Eco-Clamp ES 63 is equipped with a special cylinder drive. The integrated valve unit controls the idle and working strokes on the basis of differing compressed air demand. Full clamping force is only developed during the working stroke. Result: 48 % reduction in air consumption!

Well proven aluminium housing of the Vario series in compatible design

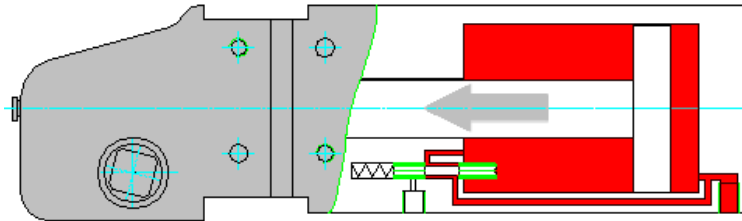
Integrated on-off valve reduces compressed air consumption during feed stroke

Full-block aluminium cylinder



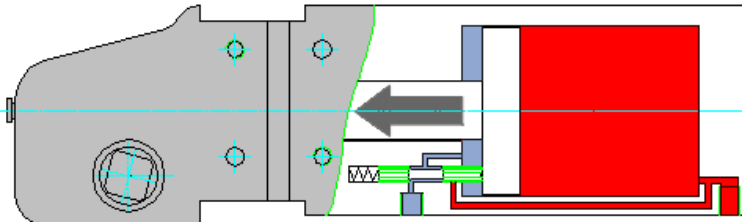
Actuating principle of the Eco-Clamp

Clamping process started



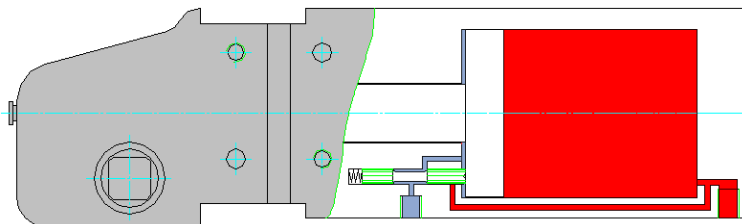
- Both cylinder chambers, ring and piston area are pressurised.
- Compressed air demand for the lifting motion corresponds to the piston rod volume.

Generation of clamping force




- Ring area is vented.
- The full cylinder force affects the piston rod – onset of clamping force.

Clamping position

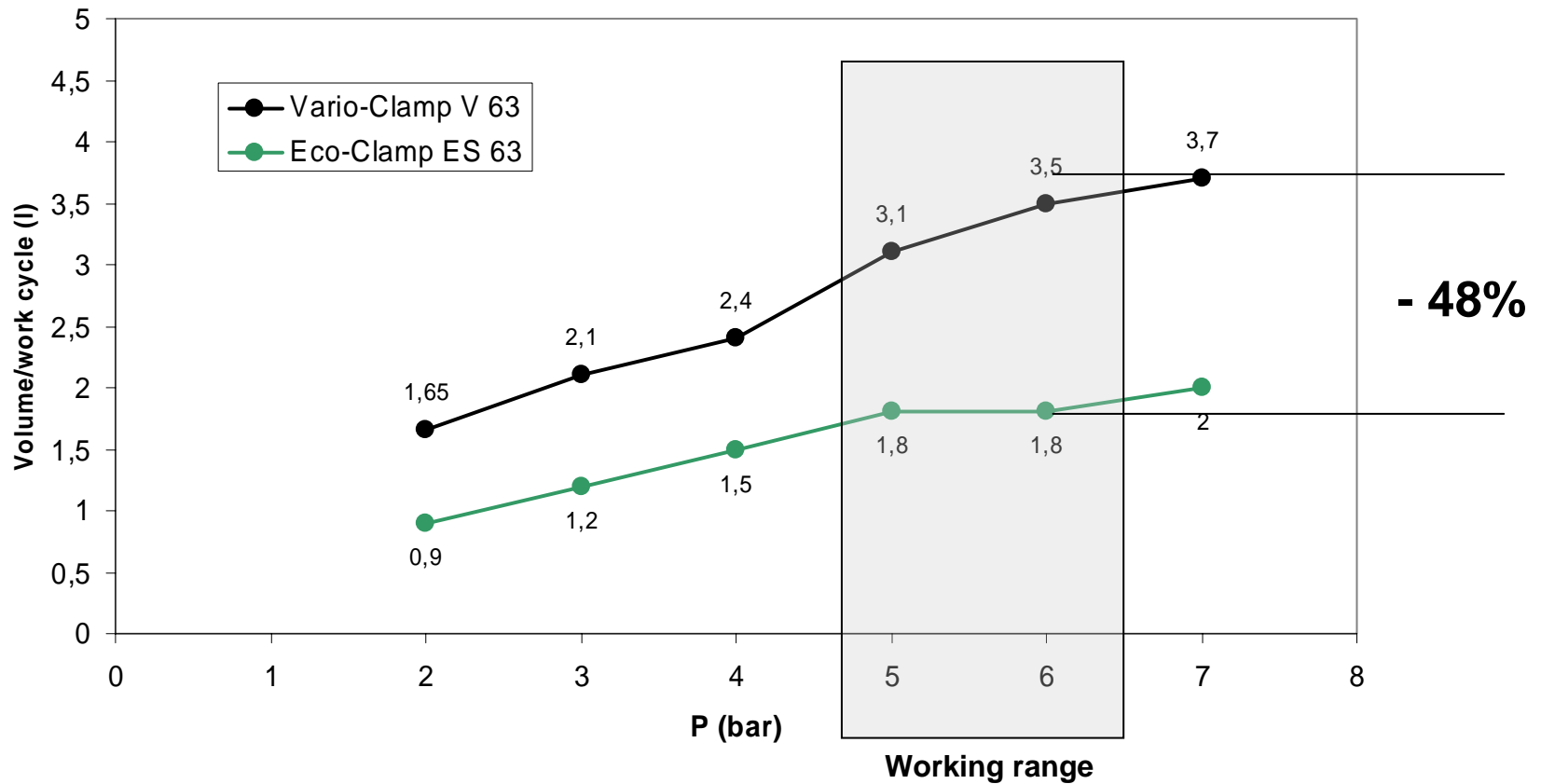


- Over-centre toggle lock position reached.
- The return stroke follows through pressurising of the ring area, as is the case with conventional cylinders.

 = pressurised

 = vented

Test results of compressed air consumption V 63 versus ES 63



Economy record

	Conventional technology V 63	Eco technology ES 63	Economy
Air consumption (6 bar)	3.5 l	1.8 l	1.7 l

With more than 1,000 work cycles, pneumatic clamps are like 'marathon runners' in body framework. Over a project term of, for instance, 8 years more than 2 million cycles are achieved.

Anything that moves, requires a lot of energy. Thus, the energy efficiency of the Eco-Clamp with a consumption reduced by circa 48 % provides for considerable savings potential.

Compressed air economy	Single clamp	5,000 clamps
Per day:	$1.7 \text{ l} * 1,000 \text{ cycles} = 1,700 \text{ l} = 1.7 \text{ m}^3$	8,500 m ³
Per year:	$1.7 \text{ m}^3 * 250 \text{ days} = 425 \text{ m}^3$	2,125,000 m ³
During the project:	$425 \text{ m}^3 * 8 \text{ years} = 3,400 \text{ m}^3$	17,000,000 m ³

The CO₂ record

	Conventional technology V 63	Eco technology ES 63	Economy
CO ₂ emission / cycle	0.21 g	0.11 g	0.10 g

Compressed air consumption is energy consumption and thus equivalent to CO₂ production. The energy consumption of the pneumatics is calculated on the basis of the installed compressor capacity. The generation of 1 m³ compressed air (6 bar) requires a capacity of approx. 0.1 KWh¹. According to GEMIS Datenbank² circa 600 g CO₂ are emitted per generation of 1 KWh on the basis of the power plant mix common in Germany.

1 m³ compressed air consumption generates a CO₂ emission of 60 g

CO₂ reduction	Single clamp	5,000 clamps (production line)
Per day (1,000 cycles)	0.1 kg	0.5 t
Per year (250 days)	25.0 kg	125 t
During the project (8 years)	200.0 kg	1,000 t

¹ www.drucklufttechnik.de

² Eco-Institute

The cost analysis

	Conventional technology V 63	Eco technology ES 63	Economy
Operating costs / cycle	0.035 cent	0.018 cent	0.017 cent

In literature, the costs for compressed air are estimated differently in a range between 2 and 20 cents per m³ depending on the relevant source. The following calculation results on the basis of a mean value of 10 cents per m³:

Cost reduction	Single clamp	5,000 clamps (production line)
Per day (1,000 cycles)	0.17 €	850.00 €
Per year (250 days)	42.50 €	212,500.00 €
During the project (8 years)	340.00 €	1,700,000.00 €

¹ www.drucklufttechnik.de

The optimised energy efficiency of the Eco-Clamp with a reduced compressed air consumption by about 48 % leads to a concrete CO₂ reduction of 25 kg and savings of 42.00 € per year as to energy costs.

Thus, the Eco-Clamp ES 63 is not only an active contribution to environmental protection but also a resource that pays off!

Eco – Clamp in technical comparison

Basis: Clamp arm 100 mm, 6 bar operating pressure, 3m compressed-air hose, Ø 8 mm inside

Type 63	K series	Vario series (with el. attenuation)	Eco series	Eco series with valve
Dimensions	370 x 110 x 55	360 x 110 x 55	380 x 110 x 55	380 x 110 x 55 (+ valve width)
Weight	4.10 kg	4.22 kg	5.18 kg	ca. 5.3 kg
Clamping force	380 dN	380 dN	380 dN	380 dN
Holding force	800 dN	800 dN	800 dN	800 dN
Infeed force	50 dN	50 dN	12 dN	12 dN
Cycle time*:				
Opening:	300 ms.	600 ms.	300 ms.	Not calculated
Closing:	400 ms.	400 ms.	500 ms.	
Cycle:	700 ms.	1,000 ms.	800 ms.	
Air consumption l (cycle) clamp	3.5 l	3.5 l	1.8 l	1.8 l
Air consumption (cycle) Clamping position incl. Compressed air hose (3m) ≈ 1,8 l	5.3 l	5.3 l	3.5 l	1.8 l
Costs	180 €	200 €	240 €	≈ 300 €

* Calculated without external throttling

Further TÜNKERS Eco-Technology Products in Development

Retractable
locating pin
SZ-series



Toggle press
PFE series



Pneumatic cylinder
ZFE series

