Iris® Process Control Valve

Energy-saving regulation of activated air

Improved process control with a potential 20 % blower energy reduction

Creation and delivery of dissolved oxygen used in the activated sludge process consumes up to 60% of the energy in the wastewater treatment plant. Finally, Biological processes can be optimized, Blower discharge pressures reduced, DO set-points lowered, and energy saved as a result of the Iris® valve's superior «linear» flow characteristics providing stable, accurate, repeatable, reliable air flow regulation, and process control.

Over the past 40 years, the Egger Iris® flow control valve has been successfully used in hundreds of wastewater treatment plants as the best solution for precise air flow regulation to the aeration tanks.

Engineered for your plant – Iris® valve sizing and selection process

Plant operating parameters including system pressure (static & dynamic), blower discharge pressure, discharge air temperatures, and allowable pressure drop across the valve enables engineers at Egger to properly size and select the appropriate flow control valve for your system.

SCADA Systems, PID loops, and Algorithms

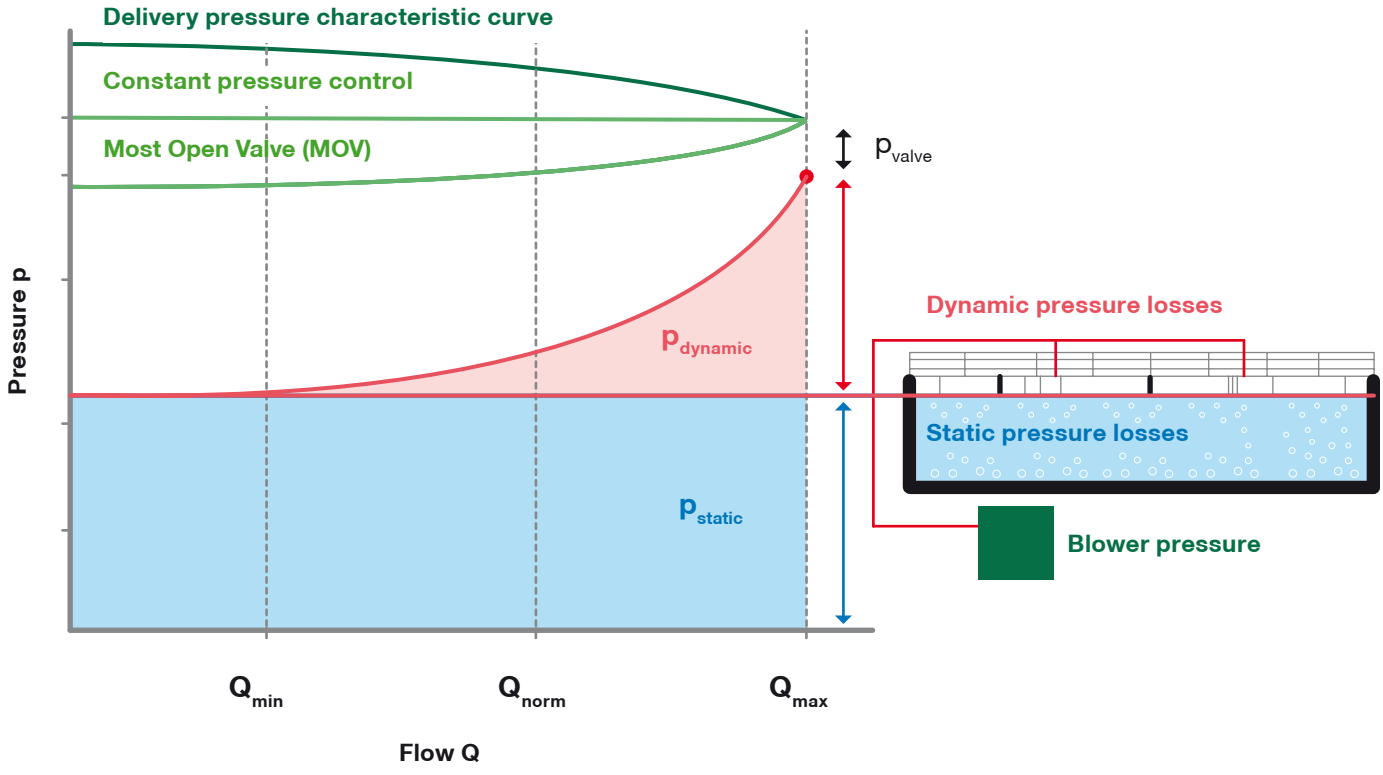
Constant pressure control: system pressures are kept constant to control flows.

Most Open Valve: uses the Iris® valve's characteristic curve with constant pressure control, blower speed, valve position at full or partial flows, and flow rate in each dropleg. This requires a large control range.

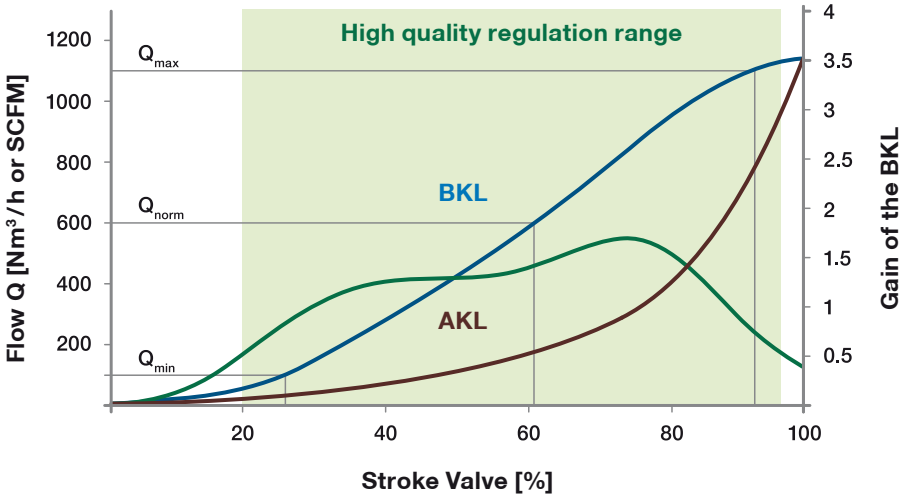
Valve characteristic curve AKL

The valve characteristic curve is required to dimension a valve in accordance with DIN EN 60534 (ANSI/ ISA-75.01.01). The dependence of the flow coefficient on the stroke is known as the valve characteristic curve.

The flow coefficient or C_V (K_V in metric system) describes its throughput capacity. This is determined on a test rig at constant differential pressure (1 psig) and at different valve settings.



Dimensioning of an Iris® diaphragm control valve according to DIN EN 60534



Calculation of the throughput for gases with temperature correction

Metric (K,)

$$Q_N = 514 \cdot K_V \cdot \sqrt{\frac{\Delta p \cdot p_2}{\rho_N \cdot T_1}}$$

Q_N	Volume throughput of gases in a normal state (0°C, 1013 mbar)	Nm^3/h
ρ_N	Density of gases in a normal state	kg/Nm^3
Δp	Pressure differential	bar
p_2	Absolute pressure downstream of the valve	bar_{abs}
T_1	Absolute temperature upstream of the valve	°K

US Units (C_V)

$$q_N = 1.360 \cdot Y \cdot C_V \cdot \sqrt{\frac{\Delta p \cdot p_1}{T_1 \cdot Gg}}$$

q_N	Volumetric flow rate (20°C, 14.69 Pisa)	scfh
G_g	Gas specific gravity	1 for air, dimensionless
Δp	Differential pressure	psi
p_1	Upstream absolute static pressure	psia
T_1	Upstream absolute temperature	°R
Y	Expansion factor	dimensionless

Relationship between C_v and Kv: $K_v = 0.865 \cdot C_v$ or $C_v = K_v/0.865$

Operating characteristic BKL

However, the valve characteristic only applies at constant differential pressure. Depending on the control valve settings, widely varying pressure losses occur under real operating conditions. This variable differential pressure at the control valve and the dynamic pressure losses in the system produce a distortion of the characteristic curve (see diagram). The operating characteristic represents the real relationship between the stroke and the throughput of a control valve. It is calculated from the valve characteristic curve (C_V coefficient curve) and the aforementioned operating data.

Gain V_{PV}

Generally, a linear operating characteristic is aimed for. However, under real-life conditions the operating data fluctuates significantly, which results in different operating characteristics. A certain range of high control quality is defined in measurement and control technology. This «stable» range is between 0.5 and 2.0 in case of an increase in the operating characteristic (or also an increase in V_{PV}). The basic requirement for uninterrupted, wide and stable control is an equalpercentage linear characteristic curve.

The precise, linear, repeatable, and stable properties of the Iris® flow control valve allow for cost-effective PID control loops to be easily set-up.

The ideal valve for ammonia based aeration control (ABAC).

Thanks to systematic further development, with the third generation Egger is introducing a modern and compact version of the tried-and-tested Egger Iris® valve.

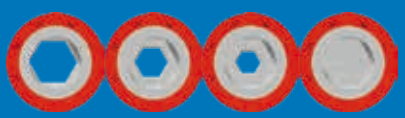
Maintenance free
A re-designed spindle nut assembly is manufactured using a self-lubricating thermoplastic material which permits maintenance free operation. No longer is regular lubrication of the threaded spindles required.

Compact
The Iris® flow control valve's compact in design offers proven accurate, stable, and repeatable flow control in a compact, space-saving installation.

Circular opening and closing
The six segments of the Iris® flow control valve are arranged to form a circular opening similar to a camera aperture. The segments can be infinitely adjusted.

Free flow cross-section
At 100 % open, the segments are completely out of the flow stream to ensure there are no constrictions in the cross-section which results in high C_V values.

Central closing flow axis
Our unique centrally closing flow axis and rounded edges result in a near perfect laminar flow profile helping to reduce noise emissions and improve inlet flow paths for accurate flow measurements.



Egger offers a measurement and control system with integrated mass flow meter as well as hydraulically optimised reduction parts.

Ideal control characteristic shape in accordance with DIN EN 60534 (ANSI/ISA-75.01.01)
The Iris® valve's K_V (C_V) value is certified in accordance with DIN EN 60534 by independent laboratories in Europe & North America. Iris® has the ideal characteristic curve required to for stable, linear, accurate and repeatable control.

Robustness and long service life
Iris® valves are proven tough and extremely reliable for control systems with high switching frequencies.

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