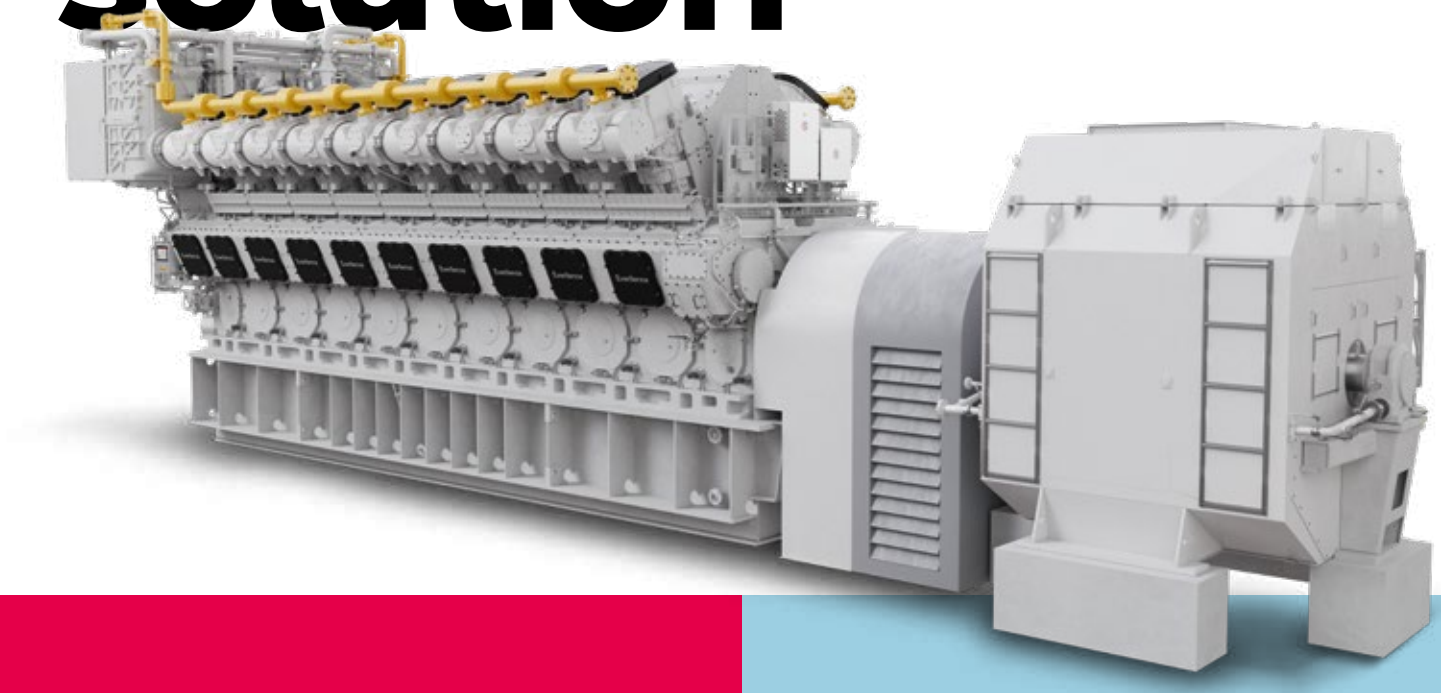
Synchronous condenser solution



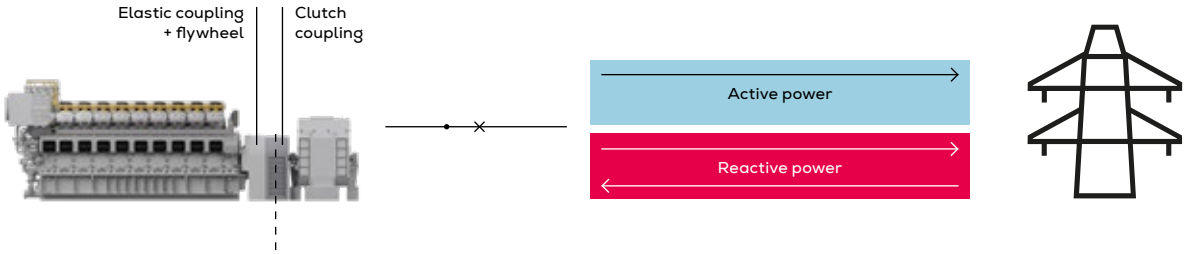
The synchronous condenser solution from Everllence combines the advantages of a genset with those of a synchronous condenser. It provides power to the grid whenever needed (GenSet operation) and improves the quality and stability of the grid even when there is no active power required (SynCon operation). This results in maximum operational flexibility for of the power plant.

Benefits at a glance

- Improves frequency stability
- Reactive power compensation
- Provides short-circuit power
- Reduces harmonics
- Active power with fast response capability & fast start

Everllence

Synchronous condenser solution



	Prime mover		Generation unit						
Operation mode	**Engine**	**Clutch**	**Synchronous machine**	**Circuit breaker**	**Active power**	**Reactive power**	**Inertia**	**Short-circuit power**	**Harmonics**
GenSet operation	Online	Engaged	Generator	Closed	Yes	Yes	Positive impact	Positive impact	-
SynCon operation	Offline	Disengaged	Compensator	Closed	No	Yes	Positive impact	Positive impact	Positive impact

Example SynCon operation with 18V51/60G

Engine type	Short-circuit power	Short-circuit ratio	Moment of Inertia$_{SynCon}$	Inertia Constant H$_{SynCon}$
18V51/60G (20.7 MW$_{mech}$)	Up to 145 MVA	Up to 7.1	Up to 24500 kgm^2	Up to 1.3 s

Synchronous condenser operation

A synchronous condenser is an electrically excited synchronous machine that rotates at grid frequency without a prime mover. By varying its excitation current, it can dynamically supply or absorb reactive power, helping regulate grid voltage within its operating limits.

Impact on the grid

Increasing shares of renewable energy sources in the electrical grid mean that conventional synchronous generators are being replaced by converter-based technologies (PV, wind, battery storage, etc.) – resulting in the following negative impacts on the stability and quality of the grid:

- Reduced reactive power compensation
- Reduced system inertia
- Reduced grid short-circuit power
- Degraded voltage, current, and frequency quality
- Critical loading of equipment due to harmonics

Our answer for improved stability and quality of the grid: Everllence synchronous condenser solution

Engine solutions

The Everllence synchronous condenser solution is available for the following engine types:

- 18V51/60, 18V51/60G, 18V51/60DF
- 20V35/44G, 20V35/44G TS

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