WÄRTSILÄ 31SG BALANCER

PRODUCT CATALOGUE

The Wärtsilä 31SG Balancer is not only powerful, but also the most powerful engine in it´s size category whilst guaranteeing reliability and efficiency. It incorporates prefabricated modules for cost-efficient plant construction and optimized OpEx for balancing applications through Wärtsilä Lifecycle services. Wärtsilä 31G Balancer sets an industry wide standard as the ideal solution for renewable power generation requirements now and in the future.

Cost-efficient plant construction

The 31SG Balancer's cost-efficient plant construction is based on prefabricated, high-quality power plant modules which allows you to start generating power faster. This results in outstanding product quality and savings in installation and commissioning work at site. You will benefit with a lower time-to-electricity which means faster time to revenue.

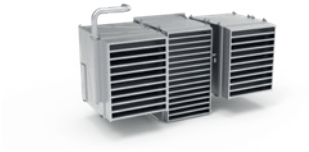
Your benefits:

- Simplify plant construction for cost-efficiency
- Install engine equipment in days thanks to our prefabricated modules
- Reduce time-to-electricity with 30% less site work
- Integrate a growing share of renewables with scalable and intelligent plug and play modules

Fast installation delivered with high quality

The power generating equipment is packaged to modules. The design allows you to pick-and-choose the desired functionality and equipment based on your project need. The essential power generating equipment has been packaged to a minimum scope of delivery, a Power unit. This can be complemented with Process modules, that enable easy integration to auxiliary equipment, process media and filtration and with Electrical modules providing engine control and monitoring. All module interfaces are streamlined and simplified to enable quick installation. The modules are ready for outdoor installation.

Power unit



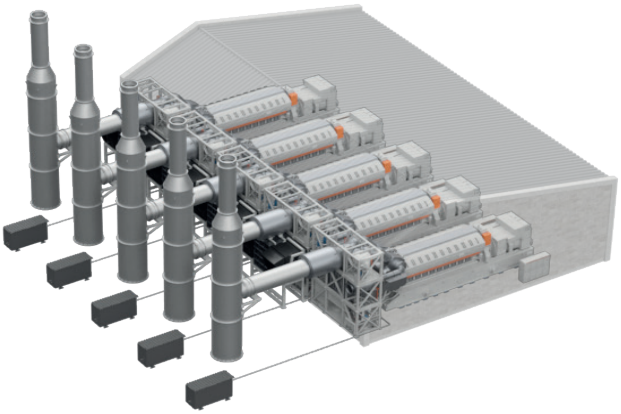
Process modules

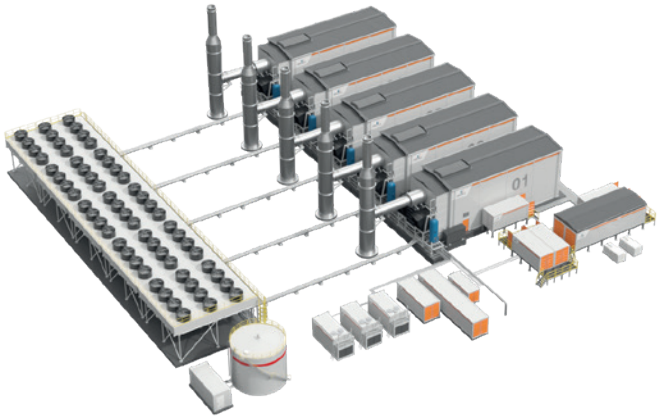
Electrical modules

Enclosure

- Reduced signal cabling and power supply cabling
- Real time data
- State-of-the art failure diagnostics
- Remote operating capabilities
- Reduced commissioning time

Configurable design





The Power unit can be installed into your own facility or you can utilise our pre-engineered Enclosure. Our Enclosure is fast to install and easy to maintain and it can be delivered to you quickly. For brownfield projects with existing power generation facilities and projects with specific architectural requirements the Power unit can be delivered loose. Well defined interfaces of the Power unit make integration to your facility straightforward.

Future-proof

Wärtsilä 31SG Balancer is the solution of carbon free future, whatever it brings: sustainable fuels, remote operations, digital technologies. Thanks to its modular design all products can be easily replaced and changed to match the need of future requirements. The solution is highly scalable and therefore supports the growing need of renewable integration.

Scalable and adaptable based on changing demands and trends

Ready for sustainable fuels – starting with 25% vol hydrogen

Seamless battery storage integration

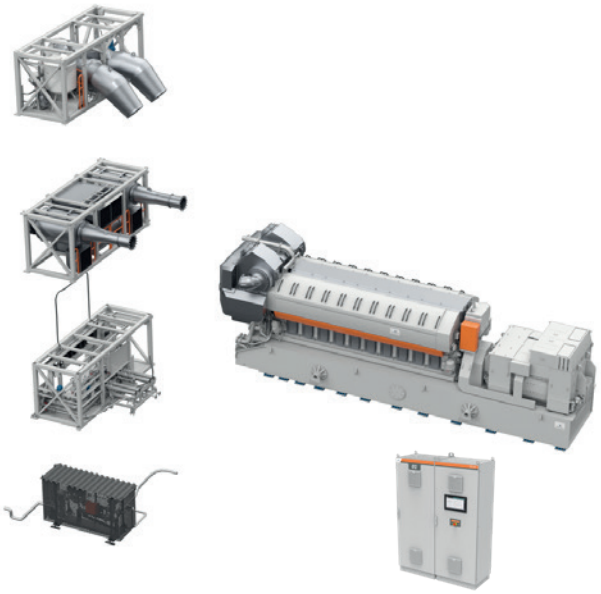
Power unit

The Power unit contains the most essential equipment for power generation:

- Generating set (engine + generator)
- Generating set control
- Key auxiliaries

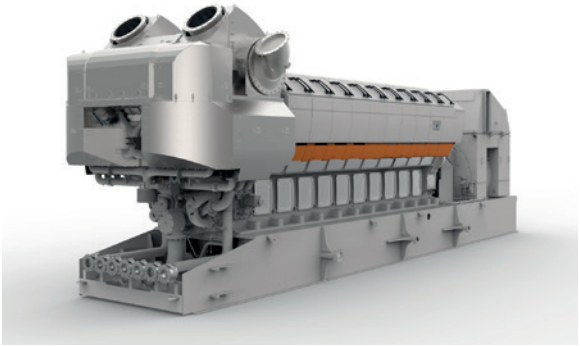
The Engine auxiliary block, the Air block and the Exhaust gas block are installed on top of each other in front of the engine. The Engine auxiliary block is connected to the engine through an adapter.

Additional blocks have predefined interfaces and the modular structure allows for a fast installation.



Generating set

Wärtsilä 31SG Balancer solution is designed for the most efficient Wärtsilä 20V31 SG engine, a four-stroke spark-ignited gas engine equipped with two-stage turbochargers. It provides world class open cycle efficiency to minimise fuel consumption and CO_2 emissions and a capability to operate on hydrogen blends.



Wärtsilä 31SG Balancer is well suited for balancing renewables and industrial applications where reducing carbon emissions while producing reliable (and agile) power is crucial. Its capability of fast starting and stopping and ability to run on sustainable fuels secures low emissions and high efficiency. It can supply power to grid in 30 seconds, and it has no limitation on number of starts, or performance degradation when started and stopped frequently.

The engine drives a synchronous three-phase generator. The generator is air-cooled using the surrounding air. It has a shaft-mounted fan, which draws cooling air through air filters. The generator is connected to the engine lubricating oil system for bearing lubrication.

The generator is equipped with various accessories for control and protection. This includes temperature sensors for monitoring the temperature of the stator winding, the bearings and the cooling air. Anti-condensation heaters prevent condensation inside the generator during periods of standby or shutdown.

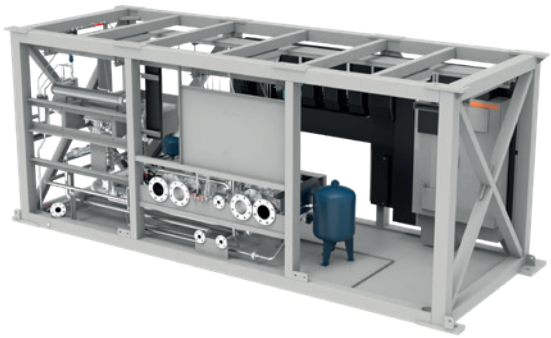
POWER UNIT MODULES

Engine auxiliary block

The Engine auxiliary block (EA block) handles the flow of process fluids between the engine and the external systems. It is connected to the engine through the Adapter. The EA block contains the essential systems for engine operation, integrated with the necessary piping, valves and instrumentation.

A local control cabinet in the EA block handles the main auxiliary control functions and power distribution for the power unit equipment. The control cabinet contains the PLC for central control of the Wärtsilä 31SG Balancer power unit, and a network switch for communication with other control equipment. A touch-screen operator panel on the front of the cabinet enables local monitoring and control commands. Plug-in connectors are provided for the electrical interfaces when feasible.

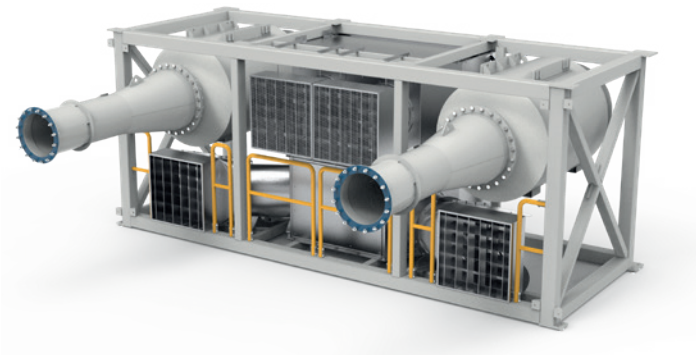
The EA block is designed to enable access to all components and provide sufficient space for the normal operation and maintenance activities. A chain hoist inside the block can be used for moving heavy components to the block entrance in maintenance situations.



- Auxiliary control panel
- Engine preheating system
- Cooling system thermostatic control valves
- Ventilation system frequency converters
- Lubrication oil supply and emptying systems
- Starting air supply to the engine
- Turbocharger washing system
- Instrument air bottle

Air block

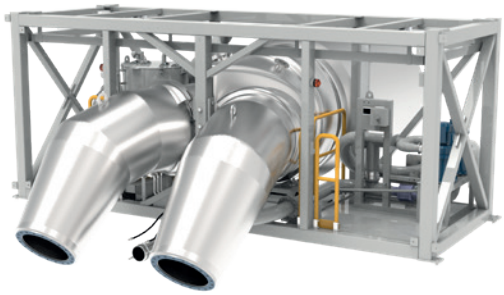
The Air block contains equipment for the charge air and process ventilation systems. Two charge air silencers reduce the noise from the engine and turbochargers. Four variable frequency drive controlled fans with directional louvres provide ventilation to the engine enclosure. A temperature controller regulates the speed of the ventilation fans based on the temperature in the engine enclosure. The Air block does not require access in normal operation situations.



- Charge air silencers
- Process ventilation inlet
- Inlet ventilation silencing

Exhaust gas block

The Exhaust gas block (EG block) leads the exhaust gases from the engine to the external ducting, handles the engine crankcase ventilation and provides the cooling system with static pressure. The EG block's adjustable exhaust gas branch pipe enables fast installation and alignment of the exhaust piping to the engine.



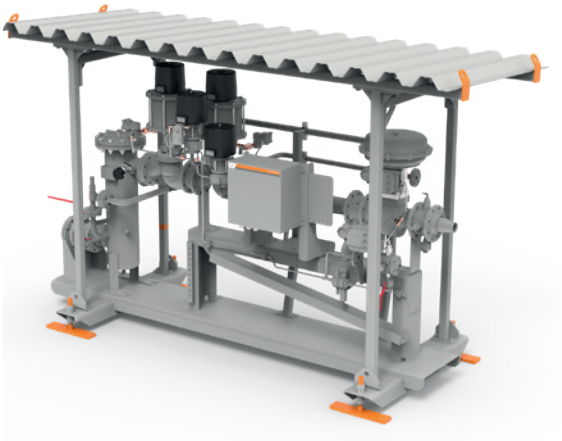
The oil mist separator unit cleans the crankcase ventilation gas from oil with two electrically driven separators. The expansion vessel provides cooling system with static pressure and deaeration.

The EG block is designed to enable access to all components and provide sufficient space for the normal operation and maintenance activities. The EG block includes the following main equipment:

- Exhaust gas branch pipe
- Oil mist separator for the crankcase ventilation system
- Cooling water expansion vessel
- Exhaust gas ventilation unit (option)
- Gas vent piping from the engine
- NOx sensor

Fuel gas supply unit

The Fuel gas supply unit (FGSU) supplies fuel gas to the engine at the correct feed pressure depending on the engine load. It is located outdoors and contains shut-off valves for cutting off the gas supply and vent valves for depressurizing the system when the engine is stopped or shut down.

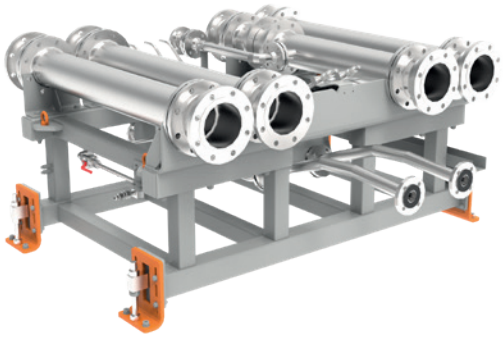


The gas outlet pressure is controlled by means of an automatic gas regulating valve. A shut-off and vent valve assembly provides a double block and bleed arrangement isolating the engine from the fuel gas supply when it is not in operation. The FGSU also includes manual gas inlet valves and vent valves.

Adapter

The Adapter is a compact module with piping and valves for connecting the engine to the Engine auxiliary block.

Flexible bellows and hoses on both sides of the Adapter reduce the transmission of vibration from the engine to the auxiliary piping.



Real-time gas analyser

The Real-time gas analyser is based on optical spectroscopy with a fast response time and is used to monitor the fuel gas and controls the engine according to variations in quality. The solution contains a sampling system that has been designed for robust & automatic operation and that is extremely easy to operate and maintain. The system is fully integrated in the plant.

Genset control cabinet

The Genset control cabinet (CFC 0_1) is to be installed in the engine hall, next to the Generator. It is used as a central control cabinet for the Wärtsilä 31SG Balancer power unit.

The CFC 0_1 control cabinet includes Industrial automation PC, Local control & monitoring interface, AVR for generator control, and DC/DC converter feeds for engine control system (UNIC).

ENCLOSURE

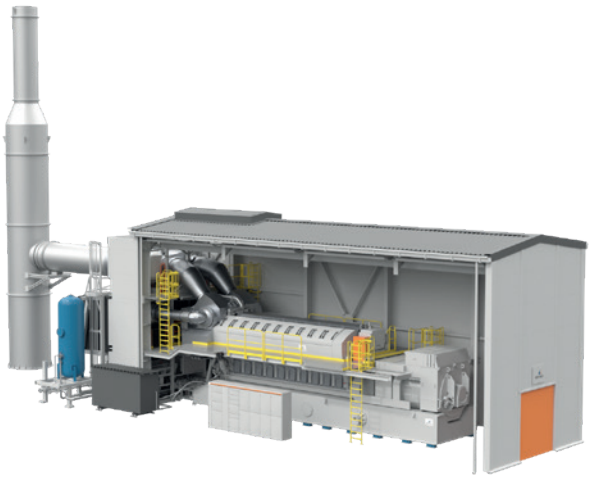
Wärtsilä 31SG Balancer enclosure is designed to serve the needs of a single Power unit in terms of weather protection, safe operation and maintenance.

Integrated maintenance platforms provide access to locations where operation and maintenance routines are performed. An overhead crane is provided for lifting heavy components.

Pre-defined cable routings and lighting enables straight-forward electrification of the enclosure. The structural design of the enclosure is based on simplified assemblies, with quick installation foremost in mind. The minimized number of connections, and a capability to perform sub-assemblies on the ground allows for quick and easy installation. Complete with wall and roof panels, the installation can be finalized within two weeks.

The ventilation system of the enclosure consists of the power units process ventilation unit, a roof monitor unit and a generator outlet duct.

Wärtsilä 31SG Balancer enclosure is designed in accordance with both ASCE and EN standards, with strict requirements for wind and seismic structural loads. This means its structural integrity suffice in very high load areas.

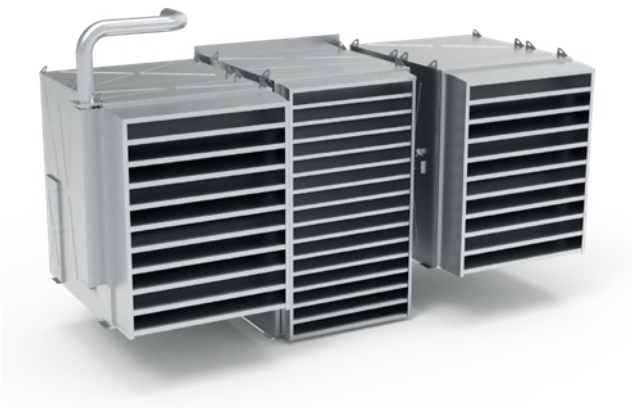


PROCESS MODULES

Filter block

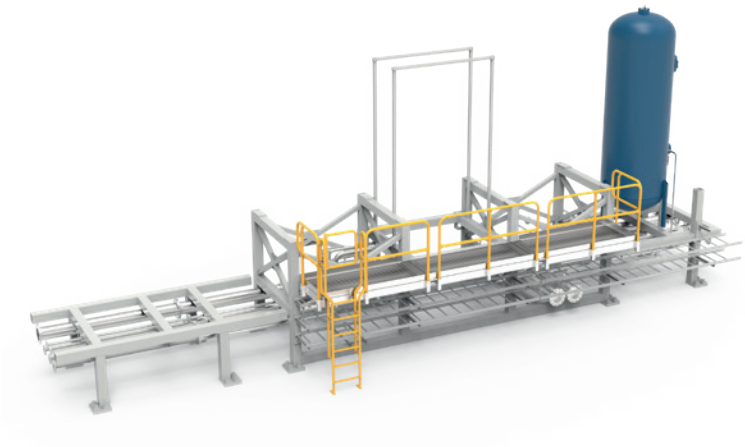
The Filter block is connected directly to the air block and contains equipment for the charge air and ventilation air intake. This includes the following main components:

- Charge air filters
- Charge air sound-absorbing elements
- Ventilation filter
- Ventilation sound-absorbing elements



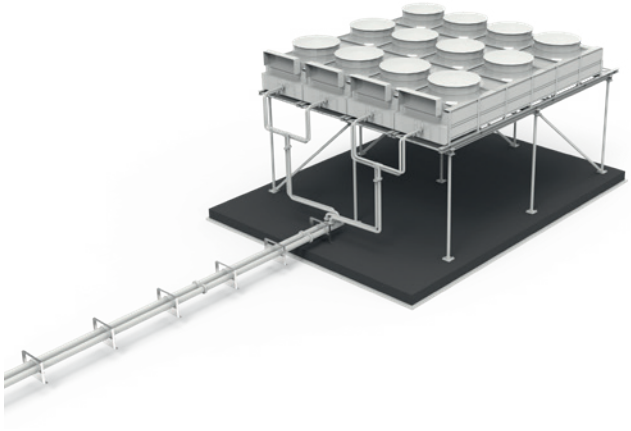
Pipe block

The purpose of the Pipe block is to connect all Wärtsilä 31SG Balancer power units and to support the Filter block. It has also a location for the starting air bottle.



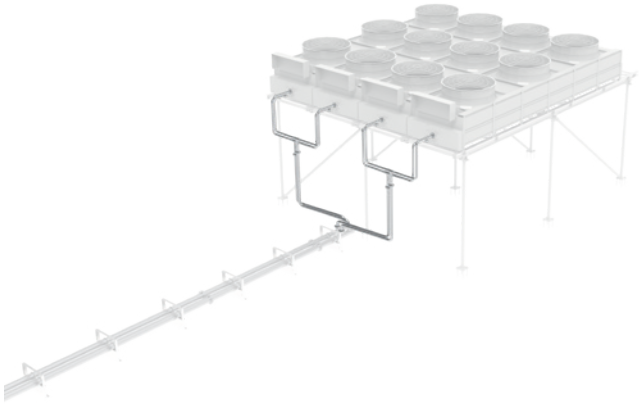
Radiator block

This block contains all radiators needed for one engine, together with an easily installed support structure and plug and play electrical equipment.



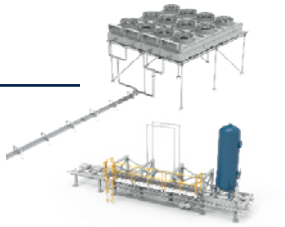
Radiator pipe rack

The Radiator pipe rack is a pre-manufactured pipe and support assembly, which is installed between the EA Block and the radiators. The correct length and parts arrive at the site for fast installation.



Discipline	Description	Power unit	Add-on´s	End-to-end solution
Genset	Wärtsilä 31 SG engine	●		
	Generator	●		
	Common baseframe and flexible coupling	●		
Mechanical and process	Engine auxiliary block	●		
	Adapter	●		
	Air block	●		
	Exhaust gas block	●		
	Fuel gas supply unit	●		
	Real-time gas analyser	●		
	Filter block		○	
	Pipe block		○	
	Radiator pipe rack		○	
	Radiator block		○	
	Hydrogen blending module		○	
	Lubricating oil tank containers (new, used/service)			X
	Compressed air container			X
	Mechanical and process, systems, equipment, and material			X
Electrical	Genset control, GEMS, CFA , Generator protection - loose supply	●		
	Medium voltage and low voltage system, cabling			X
Civil	The solution engine Enclosure with platforms and crane		○	
	Other buildings and facilities			X
	Sewage, oil waste handling			X
	Platforms, shelters			X
	Substructures, foundations, pre-phase works, and site works			X
Lifecycle	Wärtsilä operation and maintenance	○	○	X
	Wärtsilä guaranteed asset performance			X
	Wärtsilä optimised maintenance	○	○	X
	Lean operation			X

Power unit



Process modules

Enclosure

Lifecycle solutions

● = Minimum scope ○ = Optional scope X = Tailored based on project need

WÄRTSILÄ ENERGY IN BRIEF

Wärtsilä Energy leads the transition towards a 100% renewable energy future. We help our customers in decarbonisation by developing market-leading technologies. These cover future-fuel enabled balancing power plants, hybrid solutions, energy storage and optimisation technology, including the GEMS energy management platform. Wärtsilä Energy's lifecycle services are designed to increase efficiency, promote reliability and guarantee operational performance. Our track record comprises 74 GW of power plant capacity and more than 80 energy storage systems delivered to 180 countries around the world.

www.wartsila.com/energy

Worldwide contacts