



AB

A Better
Way

DeNOx SCR REACTORS

THE MOST EFFECTIVE TECHNOLOGY FOR NEUTRALIZING NO_x NITROGEN OXIDES TYPICALLY CONTAINED IN COMBUSTION PROCESS EXHAUST GASES IS SELECTIVE CATALYTIC REDUCTION OR SCR

The DeNO_x SCR reactor is used by AB to process the NO_x emissions generated by ECOMAX[®] modules powered by natural gas or by biogas from anaerobic digestion, in a scenario characterized by emission limits into the atmosphere that are increasingly more rigorous. In line with AB's quality criteria in the design, construction and dimensioning of the plants, DeNox SCR reactors make it possible to obtain the maximum NO_x abatement efficiency. The DeNO_x SCR reactor is available not only for new ECOMAX[®] systems, but also for cogeneration systems already in operation, to revamp or retrofit already installed systems for compliance with new regulations on emission limits into the atmosphere, without the need for complex modifications.

ADVANTAGES:

COMPACTNESS

The special parallelepiped shape and insulation contribute to the general reduction in the size of the DeNO_x SCR reactor. Moreover, AB offers special technical solutions for integrating the DeNO_x SCR Reactor into plant layouts characterized by reduced technical spaces.

CATALYST REGENERATION

Having reached their minimum useful efficiency after thousands of hours of use, the catalyzed substrates that allow the reactor to function can be regenerated through a technological process capable of restoring the catalyst to its initial level of performance.

MANAGEMENT SYSTEM ON SCADA

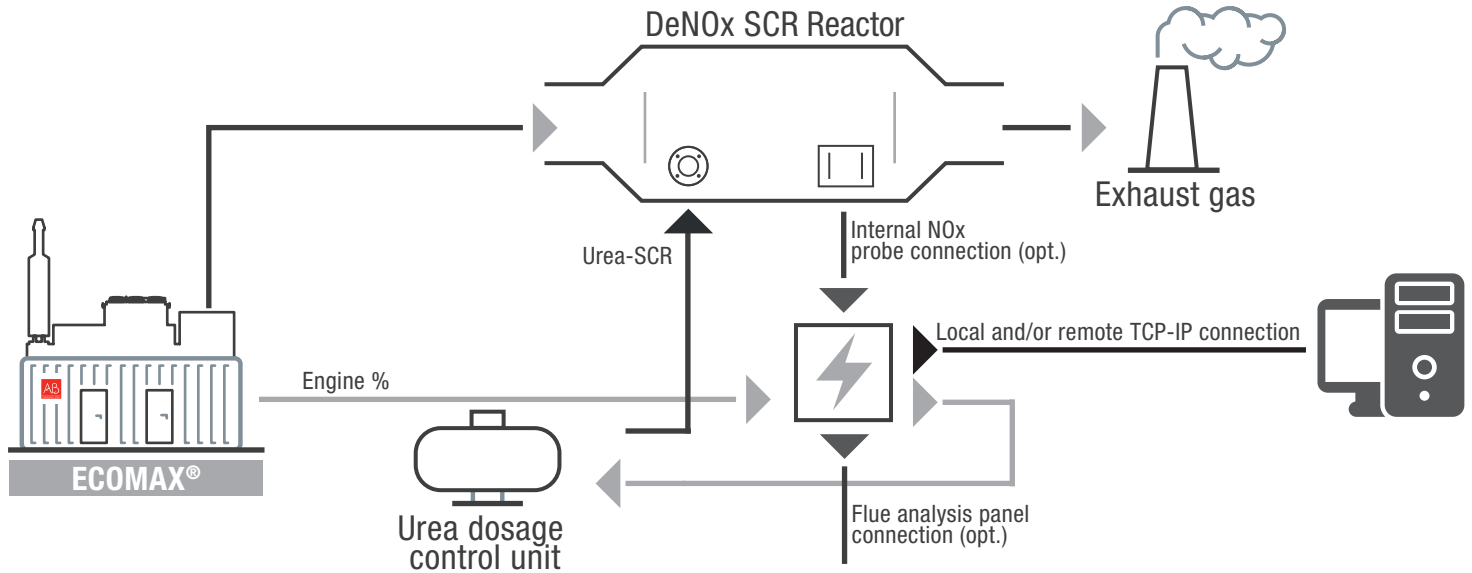
The DeNO_x SCR management system is fully integrated with the SCADA ECOMAX[®] supervision and control system. It is possible to monitor and configure the operation parameters of the NO_x reduction system from the supervision PC. The supervisor is based on the WIN-CC SCADA Siemens software platform, a state-of-the-art solution that AB has adopted over time for its automation solutions, together with an HMI (Human Machine Interface).

AB DESIGN

With the integration of DeNO_x SCR systems, AB proves to be an excellent partner for the development of sustainable cogeneration solutions, in line with the standards required by the most restrictive regulations on environmental protection.

OPERATION

THE DeNO_x SCR COMPKAT REACTOR CONSISTS OF DIFFERENT STAGES OF PURIFICATION, IN ORDER TO GUARANTEE AN OPTIMAL RESULT.



The system consists of a nitrogen oxide reduction section, which ensures the controlled dosage of an aqueous solution of technical-grade urea.

This solution, contained in a specific storage tank, is carefully dosed using an economizer nozzle in the exhaust gas flow, where it is mixed using static mixers installed inside the flue gas pipe. The gas/reagent mixture then reaches the DeNO_x reduction reactor where it passes through the catalytic layers, on whose porous surface the SCR reaction takes place, converting the NO_x into water vapor and elemental nitrogen.

Downstream of the DeNO_x reduction section, an oxidizing honeycomb catalyst with a metal matrix is installed. This removes carbon monoxide, unburnt non-methane hydrocarbons and traces of residual NH₃, well below the limits set during the plant design phase.

DeNOx SCR REACTORS FOR THE ECOMAX® NATURAL GAS LINE

DeNOx SCR reactors installed on a cogeneration plant that is part of the ECOMAX® NATURAL GAS line are designed to obtain very high yields. This makes it possible to combine an increase in the performance of the cogeneration package and attention to the environment, in full compliance with the latest emission limits into the atmosphere.

ECOMAX® Model	Electrical power [kW]	DeNOx SCR model	Exhaust gas temperature at 100% load* [°C]	Urea consumption** [l/h]
ECOMAX® 5 NGS	499	30/09***	472	1,5
ECOMAX® 6 NGS	635	30/09***	454	1,7
ECOMAX® 8 NGS	851	45/16***	458	2,2
ECOMAX® 9 NGS	901	60/25	385	2,3
ECOMAX® 10 NGS	1,067	60/25	442	2,7
ECOMAX® 12 NGS	1,201	80/36	385	3,0
ECOMAX® 15 NGS	1,497	100/48	385	4,0
ECOMAX® 20 NGS	2,006	135/64	365	5,0
ECOMAX® 27 NGS	2,681	170/80	386	6,5
ECOMAX® 33 NGS	3,352	200/100	386	8,5
ECOMAX® 44 NGS	4,404	250/120****	367	10,6

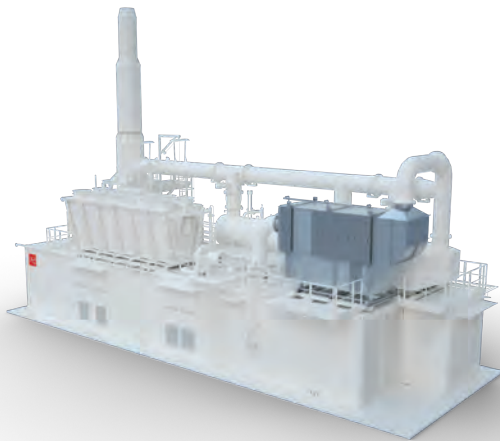
* Flue gas cooling system available on request to work at partial loads at temperatures above the limit. Limit temperature (continuous operation): 480 °C

**100% load, NOx <75mg/Nm³ @ 5% O₂, ADBLue 32.5%

*** Only available in split version

**** Only available in compact version

COMPACT VERSION



SPLIT VERSION



DeNOx SCR REACTORS FOR THE ECOMAX® BIOGAS LINE

The DeNOx SCR reactors installed on a cogeneration plant that is part of the ECOMAX® BIOGAS line are designed to obtain extremely high emissions abatement performance. This ensures a major synergy in the transformation of waste into resources, producing energy in a sustainable way, with attention towards environmental issues and in full compliance with the latest emission limits into the atmosphere.

ECOMAX® Model	Electrical power [kW]	DeNOx SCR model	Exhaust gas temperature at 100% load* [°C]	Urea consumption** [l/h]
ECOMAX® 5 BIO	550	30/09	451	1,2
ECOMAX® 6 BIO	635	30/09	476	1,4
ECOMAX® 7 BIO	732	45/16	451	1,6
ECOMAX® 8 BIO	851	45/16	484	1,8
ECOMAX® 9 BIO	901	60/25	414	2,0
ECOMAX® 10 BIO	1,067	60/25	465	2,3
ECOMAX® 12 BIO	1,202	80/36	414	2,6
ECOMAX® 15 BIO	1,497	80/36	415	3,2

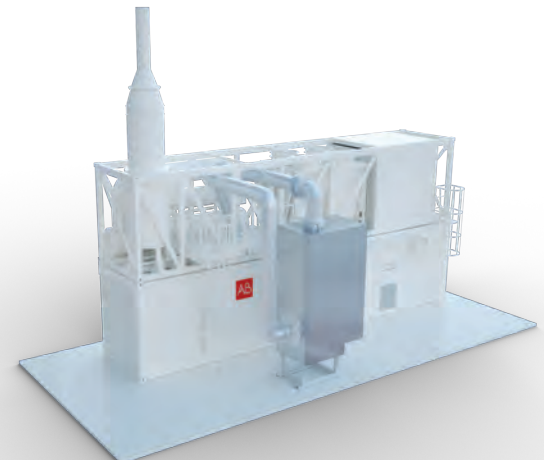
* Limit temperature (continuous operation): 550°C

**100% load, NOx <100mg/Nm³ @ 5%O₂, ADBlue 32,5%

Configuration available for revamping of existing ECOMAX® Biogas modules



Configuration available for ECOMAX® NEXT biogas modules



CASE HISTORIES



SPUMADOR SCR - ECOMAX[®] 30 NGS

Installed in 2012, the Spumador trigeneration plant consists of 3 separate modules, has an electrical power of 3 MW and produces electricity, steam and cold water which are used in the production process. In 2019, the revamping of the cogeneration system also included the installation of an SCR for the treatment of exhaust gas emissions, consisting of a catalytic reactor capable of breaking down the nitrogen oxides and carbon monoxide produced from the combustion of methane that powers the generator.

Spumador has adopted this technology energy in a sustainable way, maintaining a concentration of NO_x in the atmosphere below 50 mg/Nm³ and a concentration of carbon monoxide below 20 mg/Nm³, well below the current limits set by law in Italy.



AWG DONAU-WALD - ECOMAX[®] 15 BIO

Installed in 2020, the Donau-Wald cogeneration plant has an electrical power of 1.5 MW which, every year, facilitates the transformation of thousands of tons of organic material into biogas for the production of electrical and thermal energy. The SCR system is installed on the cogeneration module in a new configuration, which has been retrofitted. In fact, the system, today only equipped with a catalyst for reducing carbon monoxide and formaldehyde, has already been configured for complete integration with the NO_x as required by the 2023 German regulation. The integration can therefore take place at a later time, without any structural modifications required.



NOVARETI - ECOMAX[®] 44 NGS

The Novareti company owns and manages the district heating system in the city of Rovereto (in Trentino, Italy). In order to update and redevelop its heat production systems, Novareti has built a new cogeneration plant with an electrical power of 4.4 MW. The plant is equipped with a reactor capable of breaking down the nitrogen oxides and carbon monoxide produced by the combustion of the methane that feeds the cogenerator and a PreO_x catalyst for the abatement of formaldehyde.

Thanks to this technology, Novareti is able to maintain a concentration of NO_x in the atmosphere below 75 mg/Nmc, a concentration of carbon monoxide lower than 100 mg/Nmc and a formaldehyde concentration lower than 10 mg/Nmc (values referring to 5% oxygen).



EON GRANAROLO - ECOMAX[®] 20 NGS

Granarolo has decided to upgrade its ECOMAX[®] 33 cogeneration plant installed in 2017, at the Usmate Velate site in Lombardy, Italy, with the installation of another ECOMAX[®] 20 for the production of electricity and superheated steam with an electric power of 2 MW. Equipped with the highest safety standards, the new system stands out for its compactness, its remarkable quietness of the installation and an electrical efficiency of 44%.

In order to ensure compliance with the emission limits set out by the latest regulations, the cogeneration unit is equipped with an SCR system for the treatment of exhaust gas emissions, which guarantees a NO_x concentration in the atmosphere below 30 mg/Nm³ (15% O₂, dry) and a carbon monoxide concentration below 40 mg/Nm³ (15% O₂, dry).

AB: THE “BETTER WAY” TO ACHIEVE ENERGY SUSTAINABILITY



Since 1981, AB has tackled the challenges posed by energy sustainability, working alongside our customers to improve their competitiveness while saving energy and reducing emissions. From our earliest days, we have focused on innovation to develop world-class technologies and processes dedicated to transforming the world of energy. Our objective? To ensure our customers benefit from the best energy sustainability solutions available anywhere. How? By dedicating our expertise, production capacity and excellent service capabilities to the problems at hand. In the cogeneration sector, AB's leadership team has expanded our

company's reach to encompass biofuels. We have developed advanced purification and liquefaction processes for biomethane, coupled with highly effective emissions treatment.

We take pride in the “Made in Italy” level of excellence we offer.

The AB Group now boasts over 1,000 employees in 20 countries throughout Europe, Russia and North and South America, with primary production and engineering centralized in a state-of-the-art industrial complex located in Orzinuovi, Province of Brescia, Italy. Our customers rely on us to develop the “better way” to support them with the skills, technologies and processes, so they perform at their best. Together, we are helping build a better world.



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