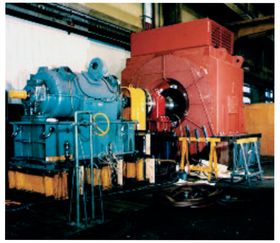
System Test Platform

Full system testing up to 45 MW



Our test room is one of the best equipped in Europe. We have recently upgraded our testing capacity and can perform full system testing in back-to-back configuration up to 45 MW at nominal operating speed. With 5 test stands covering 2.200 mq plus an additional 1.500 mq of external area for drives and transformers, we are now able to extend our rigorous testing procedures to high-power machines - an additional guarantee there will be no surprises when the equipment goes out to the field.
Test benches are independent which allows us to perform routine and type tests as well as full load testing up to 4 MW @ 1,500 r/min (1,200 r/min on Vertical machines) on several machines at the same time, helping to reduce lead times. Our data acquisition system, complete with six operating stations, records test data and automatically calculates performance results.

The following is a list of the routine tests carried out on all induction motors produced in the Monfalcone factory.

- **Windings ohmic resistance measurement**
  Test Method: **IEEE 118**
- **Direction of rotation check**
  Test Method: **IEC 60034 - 8**
  Acceptance Criteria: **IEC 60034 - 8**
- **Phase sequence check**
  Test Method: **IEC 60034 - 8**
  Acceptance Criteria: **IEC 60034 - 8**
- **No-load characteristic determination**
  Test Method: **IEEE 112**
- **Locked rotor test**
  Test Method: **IEEE 112**
  Acceptance Criteria: **IEC 60034 - 1**
- **Overspeed test**
  Test Method: **IEC 60034 - 1**
  Acceptance Criteria: **IEC 60034 - 1**
- **Vibration level measurement**
  Test Method: **IEC 60034-14**
  Acceptance Criteria: **IEC 60034 - 14**
- **High voltage test**
  Test Method: **IEC 60034 - 1**
  Acceptance Criteria: **IEC 60034 - 1**
- **Insulation resistance measurement**
  Test Method: **IEEE 43**
  Acceptance Criteria: **IEEE 43**
- **Visual and dimensional check**
  Test Method: **as per drawing**
  Acceptance Criteria: **as per drawing**

All tests are done on fully assembled machine.

For information on special or type tests as well as information on testing for synchronous machines contact our Sales Office at the address below.

Special tests which may be carried out in the Monfalcone factory:

- Heat run test
- Current, speed and torque vs. time during acceleration (squirrel cage motors only)
- Inertia moment evaluation
- Shaft voltage
- Noise (SPL, sound pressure level) at no load (according to **IEC 60034 - 9**)
- Breakdown torque evaluation
- Polarization index
- Dielectric loss factor on test coils
- Impulse voltage test
- Ring test (on stator cores before winding assembly).

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www.nidec-asi.com

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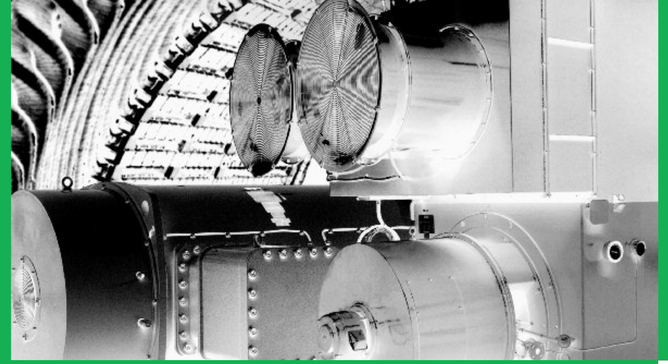
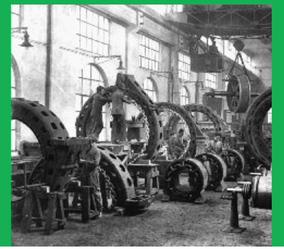


ELECTRIC MOTORS & GENERATORS
For Industrial Applications

SISTEMI INDUSTRIALI

Nidec
All for dreams

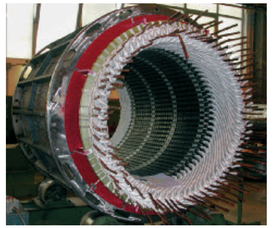
Brief History
from 1853 to Present



Nidec ASI, a destiny with roots that go back more than 160 years. Nidec ASI was formed in December 2012 as a result of the acquisition of Ansaldo Sistemi Industriali Spa (ASI) by Nidec Corporation. The company can trace its origins back to the founding of Ansaldo in 1853. ASI was born as Ansaldo's stabilimento elettromeccanico (electro-mechanical workshop) in 1899. From its inception, ASI has specialized in providing innovative power control and system solutions that have satisfied hundreds of customers worldwide. Over the past century and a half, ASI has established itself as one of the pioneers of Italian manufacturing, engineering and industry.

As part of the Nidec Group, Nidec ASI is now able to offer a wider range of customers solutions and services as a leading player in the supply of industrial automation systems, power electronics, electric motors and generators in various applications and industries such as Metals, Energy, Marine, Oil & Gas and General Industry (cement, environment, rubber and plastic, materials handling, paper and ropeway).

The Strength of proven Experience
Nearly a century of excellence in motor and generator manufacturing



What sets us apart from other manufacturers are our Customer driven design capabilities.

Whether it's pumps, turbines, compressors, alternators, ships, rolling mills, paper mills, movers, fans or special applications our motors and generators are specifically designed to meet our client's particular needs. All of our motors and generators are designed based on a flexible modular structure developed using modern computer aided engineering methods. This permits our engineering staff to efficiently configure the right machine for our Customer's application.

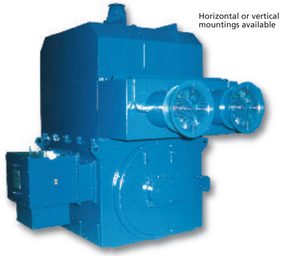
Our strengths:
- Aluminum or Copper bar Rotor
- Micasystem® VPI insulation system
- Custom tailored to meet your specific needs

We are specialists in:
High speed designs, stiff shaft designs, hazardous area machines including explosion proof enclosures, vertical machines up to 10,000 kW (13400 HP) and special applications.

About Nidec Corporation
From its origins, in 1973, the goal of Nidec Group has been to become number 1 in electric drive solutions, with a strong focus on electric motors. Over the years, through hard work and determination, the company has grown, expanding from its original product base of motors for Information & Communication Technologies into motors for home appliances, automobiles, office equipment and industrial machinery. Quoted on the New York Stock Exchange (NYSE) since 2001, Nidec is headquartered in Kyoto, Japan.
Through the combined strength of these two significant experiences, a new era in industrial drive solutions has dawned: today Nidec ASI is ready to serve its customers for another 160 years.

Standard Induction Machines

Series CT/CR/CB/W/N/ET/CAD



Horizontal or vertical mountings available

Our standard induction machines are built with an aluminum squirrel cage rotor. Rotor packs are made from single punch laminations up to size 1000. Larger packs are made using lamination segments. End rings are made of a special aluminum alloy which is welded to the cage using state of the art techniques. Stators are built as self contained units which are mounted into the frame after the coils have been inserted and the whole unit has undergone our **MICASYSTEM®** VPI process.

Micasystem®

Our Micasystem® VPI insulation system is one of the best on the market. This system is based on a special mica tape and a blend of solventless expoy resins. Due to its outstanding dielectric and mechanical properties this class F insulation system is qualified for use in nuclear power stations and highly aggressive environments.

Series CT

Type of cooling: **IC 611**

Series CR

Type of cooling: **IC 81 W**

Series W/N/CB

Type of cooling:
IC 01 CB and N not shown

Power rating:
150 - 25,000 kW
200 - 33,000 HP

Voltage:
up to 15 kV

Mass:
1,500 - 120,000 Kg

Number of poles:
2 - 36

Frame size:
315 mm through
1120, 10, 11, 12, 13

Hazardous area machines - Series CAD/ET

Our standard explosion proof protection is:
EEx d IIB T3/T4
Sleeve or antifriction bearings available.
EEx d IIB H2 or IIC upon request

Power rating:
150 - 4,500 kW
200 - 6,000 HP

Voltage:
up to 7,2 V

Mass:
1,800 - 20,000 Kg

Number of poles:
2 - 20

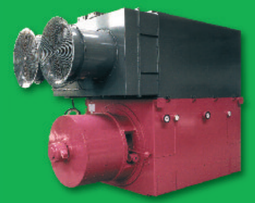
Frame size:
355 - 800 mm

Type of cooling:
IC 511, IC 411

We also offer a wide range of pressurized "p", non sparking "n", and increased safety "e" machines.

Synchronous Machines

Series MS/GS



Horizontal or vertical mountings available

As a standard our synchronous machines are built with either salient pole or cylindrical rotors, depending on the speed and size of the machine. Designed to meet specific application needs on a job-by-job basis, our synchronous motors provide outstanding performance and reliability. These machines are the preferred choice on large compressor and vertical pump applications. They are also widely used for wind tunnel fans and cycloconverter applications. Nidec ASI also has consolidated experience in generators coupled to diesel engines and turbines of all types.
These generators are specifically designed with all the construction features to withstand the pulsating torque generated by a diesel engine to ensure smooth parallel operation. The construction features on our synchronous machines are basically the same as those on our induction motors for similar applications.

Series MS

Power rating:
150 - 45,000 kW
200 - 60,000 HP

Voltage:
up to 15 kV

Mass:
1,500 - 160,000 kg

Number of poles:
2 - 36

Frame size:
450 - 1120 mm,
10, 11, 12, 13

Type of cooling: IC 01, IC 81W, IC 611, IC 31

Series GS

Power rating:
150 - 45,000 kVA

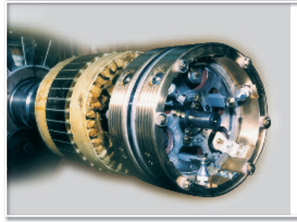
Voltage:
up to 15 kV

Mass:
1,500 - 160,000 kg

Number of poles:
2 - 36

Frame size:
450 - 1120 mm,
10, 11, 12, 13

Type of cooling: IC 01, IC 81W, IC 611, IC 31



Brushless excitation system:

As a standard our synchronous machines are supplied with a brushless excitation system. Our brushless excitation system was specially designed to resist even the heaviest industrial application.

High Speed VFD Packages

Cutting Edge Technology

Nidec ASI has over 10 years of experience in the manufacture of high-speed motors. Reaching over 20,000 r/min these hi-tech machines are the epitome of our superb engineering capabilities. Generally used in pump and compressor applications, these packages offer energy efficiency and low maintenance advantages over traditional motors with gear box. Coupled with our state-of-the-art variable speed drive controls, these packages are pushing the edge of electric drive technology as a replacement for mechanical prime movers.

Power rating:
500-15,000 kW

Voltage:
up to 15 kV

Mass:
4000-40,000 kg

Speed range:
70% - 105%

Top speed:
20,000 r/min

Type of cooling:
IC 86 W, IC 37,
IC 616, IC 06

Series HS

Power rating:
5000 - 75,000 kW

Voltage:
up to 15 kV

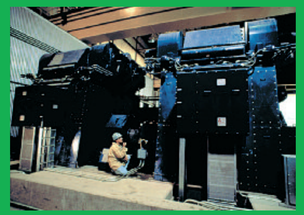
Mass:
10,000-160,000 kg

Speed range:
70% - 105%

Top speed:
8,000 r/min

Type of cooling:
IC 86 W, IC 37,
IC 616, IC 06

Series MS

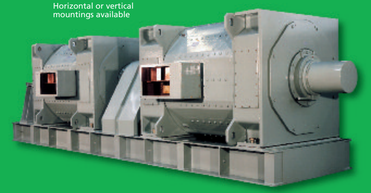


Our service committment:

Nidec ASI's service and support network is never more than a phone call away.
Our call centers provide 24 hour 7 day a week support and, if further assistance is needed, our technician can be on site within 24 hours in Europe, the U.S., Canada and Mexico, and 72 hours anywhere else in the world.
We're rapidly expanding our network of authorized service centers locally to serve you better.
Nidec ASI also offers original manufacturer renewal parts, preventive maintenance and training programs for site technicians.
Contact us for the service center nearest to you.

DC Machines

Series GH / Series DH / Series MD 800-MDL 800



Horizontal or vertical mountings available

Our DC motors and generators come in 22 different shaft heights and nearly 100 different frame sizes to cover all applicable industry applications.

All DC machines are laminated frame design and can be supplied by any DC converter system.

Our DC series offers outstanding performance features:

- high dynamic response
- wide speed range
- high maximum speeds
- high efficiency
- high commutating capacity during current transients

Power rating:
2 - 6,000 kW (at 150 r/min in tandem)

Voltage:
up to 1,000 V

Mass:
100 - 110,000 kg

Frame size:
80 - 900 mm

Type of cooling:
IC 06, IC 00, IC 666,
IC 86 W, IC 37, IC 17

Series GH/DH

Power rating:
up to 500 kW

Voltage:
up to 500 V

Mass:
400 - 9000 Kg

Number of poles:
4 - 6

Frame size: 804 - 824 (split frame) 810 - 816 (laminated frame)

Comply with AISE
(Association of Iron and Steel Engineers - Usa) n. 1 Std

Series MD 800 - MDL 800

With over 100 years of combined experience in motor and generator manufacturing, Nidec ASI is the expert in special application machines.

Despite the considerable growth in the use of AC drives over the year, DC machines continue to be used in a variety of markets thanks to their intrinsic value.

Special designs for GH/DH series include:

- Totally enclosed non ventilated motors for outdoor applications (with IP55 type protection). These machines are particularly adapt for heavy duty handling and lifting systems.
- Electric Motors and Generators for marine applications: propulsion, thruster, auxiliary services. These machines have been installed effectively in low noise vessels, providing optimum performance.

Insulating systems on DC line are class H; large frames (above 225) always provided with compensating windings.