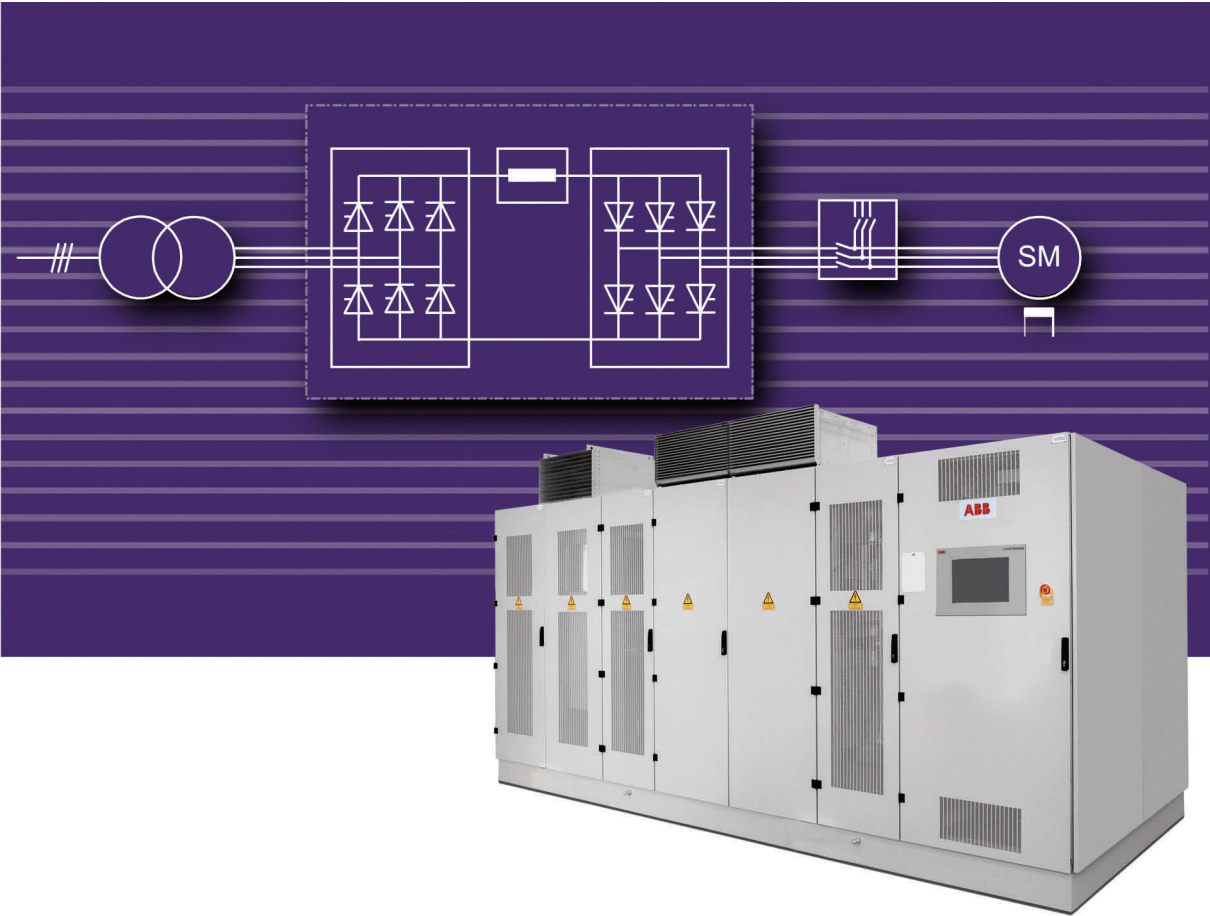


MEGADRIVE-LCI

Static Frequency Converters for soft starting of synchronous machines in power plants.



MEGADRIVE-LCI -Proven technology

ABB pioneered the static starting method for gas turbines and synchronous motors, introducing the first static starting configuration to the market in 1974. Over the years it has become the standard starting technology for heavy-duty gas turbines and pumped storage hydro turbines. Gradual improvements of the original design has led to a system which today represents a state-of-the-art Static Frequency Converter. The ABB system configuration ensures very high starting reliability and also increases gas turbine availability.

Vast operational experience

During its 30 years of production, the MEGADRIVE-LCI has gained an undisputed reputation for reliable operation in the harshest environments.

Unmatched reliability for high powers

The MEGADRIVE-LCI is the preferred choice when it comes to reliable and efficient operation in applications requiring high-power and high-voltage. Standard designs of the MEGADRIVE-LCI are offered and range up to 72 MW in size, and engineered designs of 100 MW and beyond are also available.

In 1997, ABB set a world record by delivering the largest and most powerful electric variable speed drive to NASA. The MEGADRIVE-LCI controls the 135'000 hp (101 MW) synchronous motor of a wind tunnel fan.

Worldwide references

ABB has more than 750 MEGADRIVE-LCI units installed worldwide for a total combined power of 4300 MW, including applications in power plants, the oil, gas and chemical industries, in water pumping stations, marine propulsion systems and in test stands.



Gas fired turbine power plant

Benefits:

- More than 30 years of operational experience
- High efficiency
- High reliability and availability
- Also used for motor and generator (braking) operation
- Low maintenance requirements
- Standard designs are available for powers up to 72 MW and voltages up to 10 kV



Load Commutated Inverter (LCI)

Static Frequency Converters enable gas turbines to be run up to a speed above which they are self-sustaining. At this speed, the Gas Turbine can accelerate independently to its rated speed. Gas turbines often have to be started and run up quickly at short notice, while avoiding a large starting load on the public supply system.

MEGADRIVE-LCI -Soft starting capabilities

Starting a large synchronous machine on-line can have a negative impact on the network and the machine itself. These problems can be overcome with the MEGADRIVE-LCI soft starter.

Starting of motors and generators

Direct on-line starting of large synchronous machines causes inrush currents of up to six times the nominal current and imposes large electrical stress on the supply network, thermal stress on the motor and mechanical stress on the shaft string.

These problems can be overcome with the use of a MEGADRIVE-LCI soft starter. Aiming to secure your investment and keep your assets operating at their highest levels of efficiency and reliability is made possible with an ABB Static Frequency Converter.

Gas turbine starters

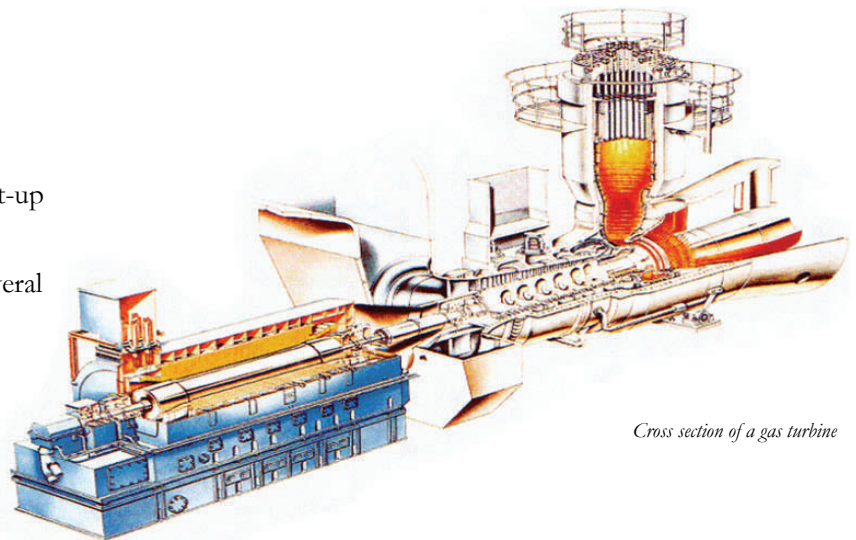
Gas turbines often have to be started and run up quickly at short notice. ABB MEGADRIVE-LCI gas turbine starters use the generator as a motor and run it up to a speed which is above the ignition speed of the gas turbine. The gas turbine can then accelerate the generator independently to its rated speed and synchronize it to the power system. Start-up with the ABB MEGADRIVE-LCI can be done within minutes.

Advantages for the user

- High reliability and availability
- No moving parts requiring maintenance
- No overloading of the prime mover or the start-up converter
- Low investment by using one converter for several gas turbine sets
- Simplified fault-finding
- Longer lifetime of equipment
- Fast start-up

Main features

- Soft starting and running up of gas turbine sets
- Fast start-up
- Selectable running-up period (5-10 minutes)
- Starting current limited to rated current or less
- Several machines can be run up one after the other
- Regenerative braking (energy fed back to the power system)
- Microprocessor-based control system
- Air-cooled
- No restriction on the number of starts or the time period between them
- No gear box required
- Integrated excitation unit for running-up (optional)
- Change over unit fitted when several frequency converters and gas turbine sets are installed in a power station (optional)



Cross section of a gas turbine

MEGADRIVE-LCI -Main components

The MEGADRIVE-LCI uses reliable, well-proven components, which were specifically designed for high-power and high-voltage applications.

Thyristors

Thyristor power semiconductors are developed for high powers, highest reliability and low losses. They have low on-state and switching losses, which results in a converter efficiency of 99%, including the DC reactor.

Rectifier

The rectifier is line commutated and forms a fully controllable DC current source in conjunction with the reactor in the DC link. A 6 or 12-pulse rectifier configuration is available for minimized harmonic influence of the converter on the supply system. The MEGADRIVE-LCI meets the most stringent requirements for current and voltage harmonic distortion as defined by IEEE, IEC and EN standards.

DC link reactor

The DC link reactor smoothes the DC current and limits its rate of change in the event of a fault.

Inverter

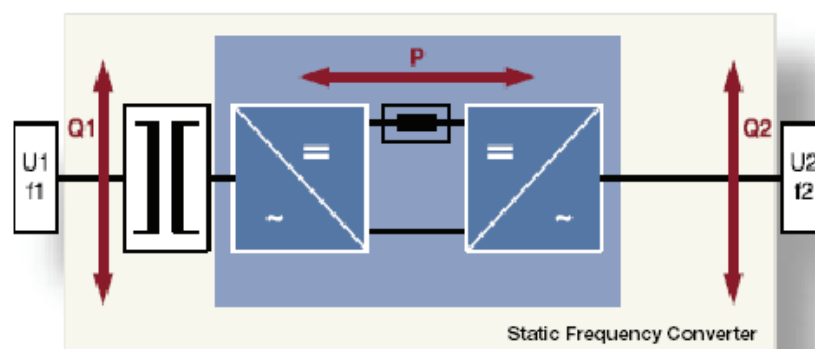
Thyristors in the inverter electronically switch the DC current to produce a 3-phase AC system of variable frequency and voltage for supplying the motor. The motor voltages commutate the inverter phase currents. At very low speeds (0-10% of rated speed), when the motor voltage is too low to guarantee reliable commutation, an artificial commutation is used. The 6 or 12-pulse inverter configuration is available for minimized influence of the converter on the ripple of the motor torque.

Starting excitation converter (optional)

The excitation converter provides the required generator field current at start-up.

Control

The control adjusts the actual torque or speed of the motor to the reference value. It generates the firing impulses for the thyristors in the rectifier, the inverter and the excitation converter to maintain the desired current, $\cos \phi$ and voltage of the motor.



MEGADRIVE-LCI -System reliability

Gas turbines or machines in pumped storage power plants must often be started and run-up quickly at short notice. The MEGADRIVE-LCI Static Frequency Converter uses the generator as a motor to run it up to a certain speed. For gas turbines, this is above the ignition speed from where the turbine can accelerate the generator independently up to rated speed and synchronize it to the power network. For pumped storage power plants, the MEGADRIVE-LCI accelerates the generator up to rated speed and synchronizes it to the power network as well.

MEGADRIVE-LCI air cooled

In order to protect the equipment from overheating, the ABB MEGADRIVE-LCI utilizes robust fans for air cooling. The specially designed fans will maintain the equipment within safe operating temperatures and ensure optimal operation of the equipment by effectively dissipating heat.



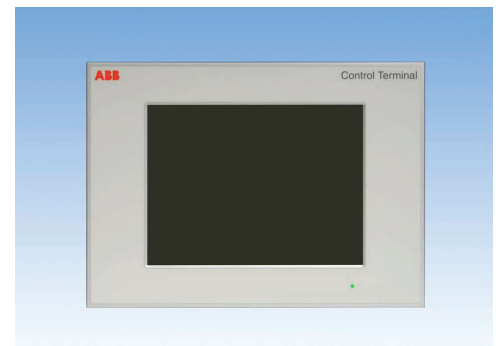
AC 800PEC Control Platform

The control part of the MEGADRIVE-LCI system uses the high-end process control system AC 800PEC, belonging to the ControlIT product line. The AC 800PEC is a modular high-speed control system, with modules arranged according to the required I/O configuration and process. It excels with very high processing speed and is fully integrated into ABB's ControlIT software environment.



MEGADRIVE-LCI Control Terminal

The MEGADRIVE-LCI Control Terminal is used for monitoring and controlling a Static Frequency Converter and is located on the system's control door panel. The Control Terminal is a powerful industrial PC with a user-friendly Human Machine Interface (HMI) that runs independently from the system's control platform. All communication is done via Ethernet connections and provides the operator with a range of selectable screens with an LCD touch screen.



Benefits:

- One MEGADRIVE-LCI converter can start several generators
- Unlimited number of starts
- Fuseless design for high reliability and less spare parts
- User-friendly Control Terminal

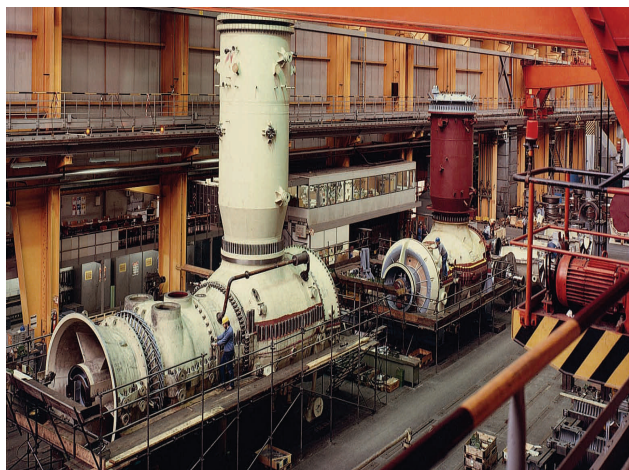
MEGADRIVE-LCI -Service, Support & Testing

To verify that the quality standards and customer requirements are fully met, every component is subjected to thorough testing. ABB also offers unrivalled service and support from the customer's initial inquiry and throughout the entire life-cycle of the system.

ABB solutions ensure the continued reliable operation and optimal performance of your Static Frequency Converter by offering a fully comprehensive service plan that will provide you with peace of mind.

Routine tests

Routine tests and functional tests form an integral part of the scope of supply of a MEGADRIVE-LCI system. They are performed in accordance with international standards and ABB quality assurance procedures (ISO 9001.)



Gas turbine

Installation and commissioning

Substantial benefits can be gained from proper installation and commissioning of the equipment. Predictive testing and inspection, in addition to traditional operational parameter setting, done by ABB's qualified and certified commissioning engineers, will reduce start-up time and cost while increasing safety and reliability. In addition, ABB customers can be given practical training by experienced specialists on site. A range of training programs are offered from basic tutorials to programs tailored to the customer's specific needs.



Technical advice

As originators of AC drives technology in the late 1960's, ABB has over 35 years of application know-how in all industrial sectors, in virtually every country. ABB's specialists are located around the world to offer advice that ensures trouble-free operation of ABB products.

MEGADRIVE-LCI -Service, Support & Testing

Certified support and spare parts

ABB understands that spare parts availability and support is critical to insure on-going operation. For this reason, ABB's global logistics network is strategically positioned to provide fast parts and repair service, 24-hours a day, 365 days a year. Our global organization uses standardized processes, tools and metrics to better serve our customers, allowing them to focus on their core business.

Life-cycle management

ABB's life-cycle management model provides customers with the maximum profit for their purchased assets by maintaining high availability, eliminating unplanned repair costs and extending the lifetime of the MEGADRIVE-LCI. Life-cycle management maximizes the value of the equipment and maintenance investment by providing spare parts and technical expertise. It also provides efficient product support and maintenance for improved reliability. This will insure a smooth transition to a new technology at the end of the products life cycle.

At home everywhere

After sales service is an integral part of providing our customers with a reliable and efficient MEGADRIVE-LCI. The ABB Group of companies operate in more than 100 countries and has a worldwide network of service operations. Wherever you are, ABB is there for you!!!



**24-hour North American service & support line
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