



**Ansaldo Sistemi Industriali**  
RESULTS TO THE POWER OF THREE

# LV VARIABLE FREQUENCY INVERTER

**MINI-HYDRO**

## **Introduction**

With its industrial experience, Ansaldo Sistemi Industriali has developed converters for specific use in hydroelectric power plants. The inverter technology, with regenerative function, guarantees reliability and high performance (98%).

## **Cooling system**

As an alternative of air cooled solutions, Ansaldo Sistemi Industriali offers water cooled solutions which guarantee low operational temperature and better performance with a very low noise level that allows the installation of hydro power plants in residential areas.

## **Active Front End**

Active Front End (AFE) technology is the most suitable solution for applications with regenerative braking, power factor control and low harmonic network content in compliance with IEEE 519 guidelines.

## **LVRT (Low Voltage Ride Through)**

The dynamic network support is the control set out to ensure grid stability in case of sudden drops in voltage.

This type of control is the Low Voltage Ride Through: power plants that sustain the grid must, in case of a voltage drop, avoid unintentional disconnection so as not to cause a collapse of the grid. Reactive power input into the grid must also contribute to its support.

## **ARTICS**

Ansaldo Sistemi Industriali's scope of supply includes ARTICS, the automation and energy management system, and connection to the main network. ARTICS allows complete control and real-time diagnostics of hydro plants, offering active and reactive speed-torque-power regulation, protection management and faults reporting via SMS and email. Our powerful SYSTEM control board allows full integration of the turbine's power management system with the inverter regulation, providing a less expensive, more reliable, higher performing solution than the traditional one based on a centralized PLC. Our control system integrates advanced functions for motor speed and torque regulation together with dedicated software libraries for process control.



**General data**

300-1400 A – 150-800kW@400V  
 170-2200 A – 160-2200kW@690V  
 Air or Water cooled

**ADVANTAGE**

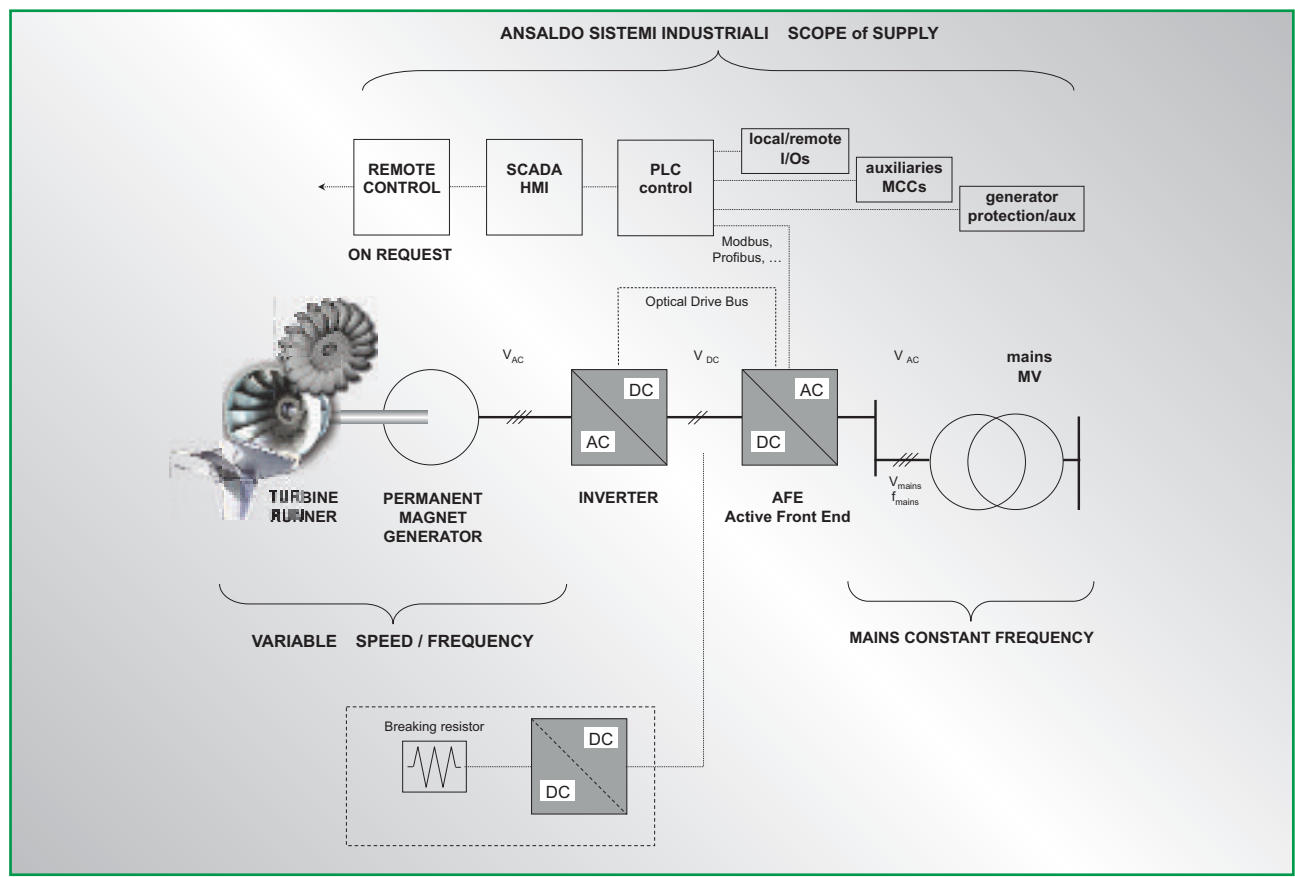
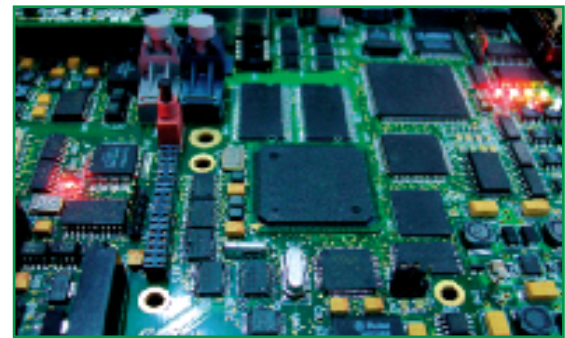
Water cooling  
 Sensorless control of PMG  
 Static converter manages reactive power  
 Variable speed (optimized on Max Power Point)  
 Low Voltage Ride Through Breaking Chopper  
 High global efficiency

**IMPACT**

Ambient conditions independent reduce noise level  
 Cheaper and reliable solution  
 Unit power factor  
 Wide operation range  
 No unintentional disconnection and grid collapse  
 Increase economic return on investment

**Main functions of the AFE inverter control**

- Synchronization with the energy distribution network
- Control and limitation of the current fed in the network
- Power factor control at the connection point with the network
- DC bus regulation
- Generator voltage limitation
- Control at variable speed-torque-power of the turbine
- Protection management and fault diagnostics
- Communication with fieldbus
- LVRT (Low Voltage Ride Through) in case of network problems



**Maintenance**

High quality capacitors use polipropylene metalized capacitors that are free from maintenance.

The average life of the installed capacitors is about 100000 hours.

Each leg/phase has wheels so that it can be easily withdrawn and reinserted in the switchboard for maintenance purposes.

