

## Case note

# ACS 5000 medium voltage drives cut risk of voltage drops in Milan



Canavese district heating plant, Italy

Two ABB ACS 5000 medium voltage drives, each serving one district heating plant in Milan, help to prevent power grid voltage drops that could cause damage to electrical equipment throughout the city.

The ACS 5000 variable speed drives have been supplied to the Canavese and Famagosta district heating plants, run by the utility A2A, the leader in the Italian district heating sector.

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### Highlights

Simplified plant start-up  
Negligible impact on the network  
Longer lifetime of equipment

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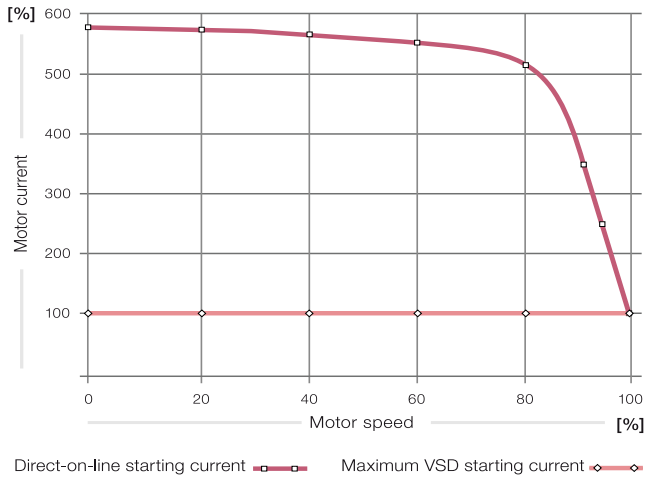
### Background

The plants have each been equipped with a Unitop® 50FY heat pump generating 15 MW of energy. Using ground water as their heat source, raised from wells and then returned to the subsoil, the heat pumps supply the heating networks connected to them with water at around 90 degrees centigrade. A2A chose heat pumps because they produce environmentally-friendly heating, requiring only one unit of electrical energy to produce three units of heat energy.

### Challenge

Machines of this capacity, driven by 6 MW electric motors, are normally fed from high voltage by a transformer. However, the two A2A plants are connected to a 23 kV medium voltage network, which is unable to support the resulting high starting current required for starting the motors directly across the line for the duration of about 25 seconds.

A direct-on-line started electric motor can cause starting currents of up to six times the nominal current. Hence, every time a machine is started up, there would be a risk that the city's network voltage could drop by 10 percent or more, which could cause malfunctions in electrical equipment across the district.



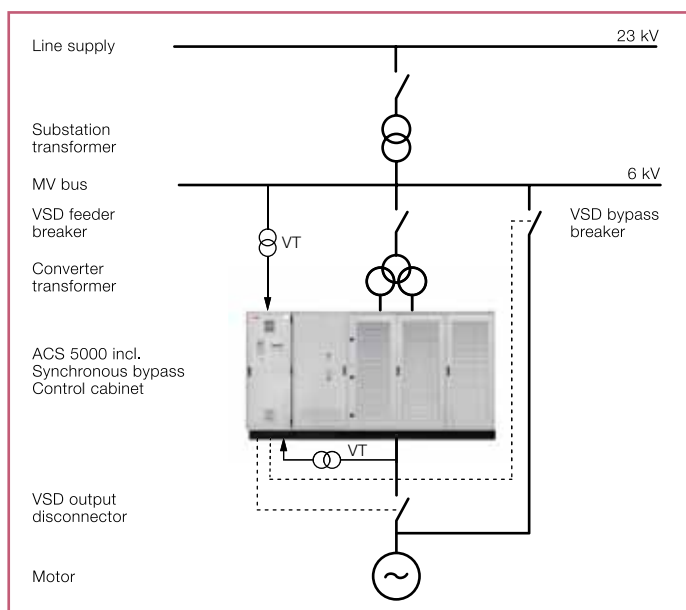
Motor current for various starting methods

### Solution

After assessing several different options, A2A chose to use electrical variable speed drives (VSDs), which offer secure soft starting of large motors, at economically attractive conditions. ABB was awarded the tender with a bid based on the ACS 5000 medium voltage drive, a compact, space saving solution.

### Synchronous bypass transfer

For soft starting functionality, ABB medium voltage drives are equipped with ABB's synchronizing device SYNCHROTECT®. It adjusts the VSD's output voltage to match the line voltage in amplitude, frequency and phase angle. As soon as all values are within a predefined tolerance band, SYNCHROTECT® initiates a smooth transfer of the motor from VSD to line operation.



Simplified diagram of the ACS 5000 with bypass breaker controlled by SYNCHROTECT®

### Benefits

Since the installation of the drives, each rated at 3 MW, plant start-up is greatly simplified, resulting in a negligible impact on the network. There is no disturbance of the process due to voltage drops; and no trips of other electrical devices connected to the same bus.

Furthermore, soft starting the motors with variable speed drives avoids excessive thermal or mechanical stress on the motors, resulting in a longer lifetime of the equipment.



### Key data of ACS 5000 product family

Inverter type	Multilevel voltage source inverter (VSI)
Power range	Air cooling: 1.5 – 7 MW Water cooling: 5 – 32 MW
Output voltage	6.0 – 6.9 kV (optional 4.16 kV)
Maximum output frequency	75 Hz (optional: + 250 Hz)
Converter efficiency	Typically 98.5% (including auxiliaries)
Type of motor	Induction, synchronous or permanent magnet motor

For more information please contact:

[www.abb.com/drives](http://www.abb.com/drives)