LOW VOLTAGE AC DRIVES

SPRS for variable speed operation of slip ring induction motor

With ACS880 drives



Efficient utilization of energy. Complete package for motor starting process. Excellent torque and speed control.

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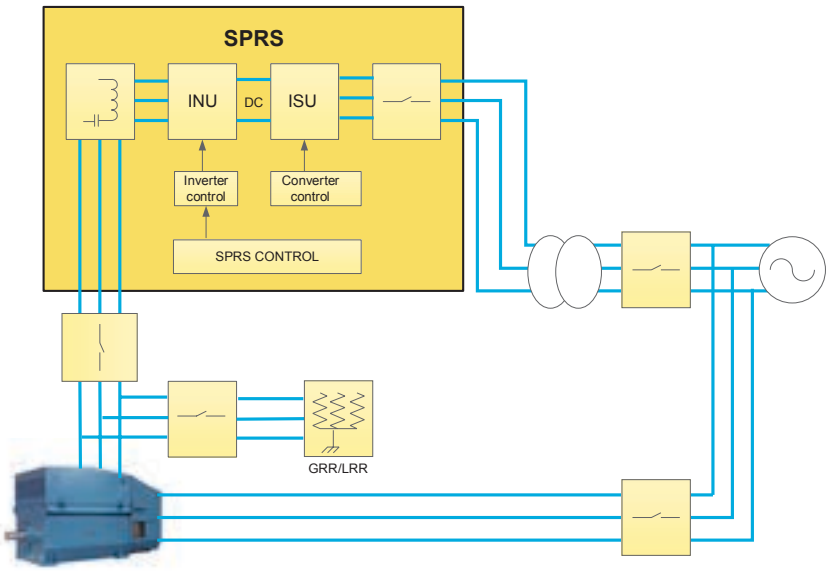
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Slip power recovery system
Energy conservation and efficient performance

Slip Power Recovery System (SPRS) technology is becoming increasingly important to achieve efficient utilization of energy in the context of energy conservation and environment protection. Slip ring induction motors are used in various industry segments like Cement, Metals & water and Waste water treatment, etc. Traditionally, speed control of slip ring induction motor was achieved through varying the rotor resistance. Continuous power flowing to the rotor resistor is a considerable heat loss.

SPRS is an external system connected to the rotor circuit providing excellent torque and speed control and also recovers power from the rotor and feeds back to the power system, avoiding wastage of energy. This system is suitable for any new installation as well as retrofits. SPRS offers the most optimum solution to adjustable speed applications with limited speed range. The power range of Slip ring induction motor can be as high as 10MW.



A slip ring motor starts by the direct-on-line method with grid rotor resistance (GRR) connected to rotor. After the motor achieves the desired speed, control can be shifted to SPRS by auto or manual operation.

SPRS consists of ACS880 Multidrive converters with dedicated control board and customized SPRS control program to facilitate optimum performance of the connected slip ring induction motor. Even in the absence of tacho feedback the system performance is ensured by using special transducers for voltage reference.

The inverter (INU) is connected to rotor winding and the converter (ISU) is connected to the power system. The transformer is used to match the system voltages. The inverter control modulates the amount of power fed back into the power system, allowing control of motor speed.

A dedicated synchronization unit with zero crossing transformer offers bumpless transfer to SPRS and GRR. Q-control offers reactive power compensation by changing the flux length for system power factor correction, which may eliminate the requirement of capacitor bank. As compared to previous methods, modern IGBT based SPRS offers unity power factor and low harmonics in the power system. Additionally, it recovers energy that was wasted as heat loss.

Package solution for slip ring induction motor with variable speed control

SPRS is part of the complete package for motor starting process. This system cordinates with the motor during the motor start-up and makes it available for process control. The motor can be started using grid rotor resistor or liquid rotor resistor, based on customer preferences and based on load torque starting requirements.

This system integrates the start-up functions and speed control functions into one drive system. On the other hand, it is also possible to retrofit the SPRS to an existing motor and retain the existing start-up functions. The level of coordination between SPRS and motor start-up functions is determined on a case to case basis.

Based on ABB industrial drives

ACS880 Multidrive provides scalable motor control from standard to customer specific applications for a wide range of industries. SPRS uses similar hardware and software as ABB industrial drives, meaning less spare parts.

Low line harmonics

The IGBT supply unit is switched at high switching frequency. Higher order harmonics are filtered out by using LCL filters. This results in low harmonics at the input and complies to IEEE 519.

Unity power factor

This SPRS uses IGBTs in converters offering unity power factor at all speed ranges.

Optimum performance and energy conservation

Smooth motor control and yet regeneration of power back to network.



The ACS880 product family is available in a power range from 0.55 to 5600 kW and at voltages of 230, 400, 500 and 690 V. Enclosure class options are IP20, IP21 and IP55. SPRS control software ordering code is +N5850



Proven technology

The system employs a DSP based technology and modern IGBTs offering superior performance and reliable operation.

Dedicated synchronization unit (RSYC) for bumpless transfer

After the rotor voltage reaches specified operating range, the control changes over from GRR to SPRS and vice versa.

Synchronisation unit (RSYC) ensures smooth and automated changeover between SPRS & GRR .

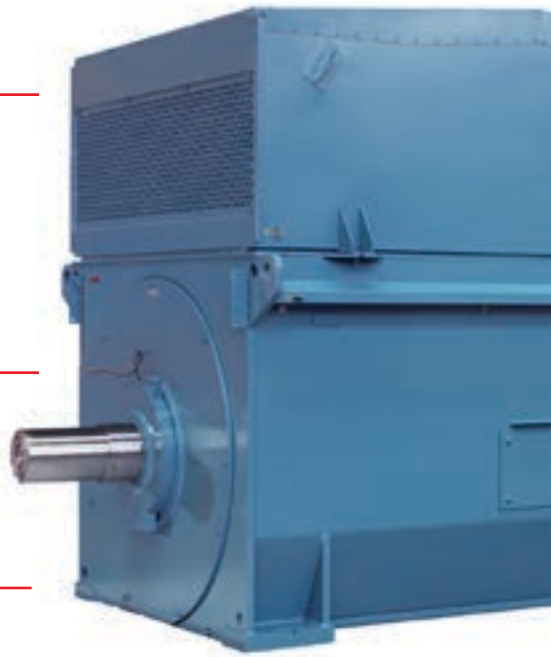
Reactive power compensation for system PF improvement

Q control facilitates reactive power control to the network by allowing leading or lagging power factor.

ABB Slip ring induction motors

High performance

The slip ring motors are used mainly for industrial applicaitons in cement, mining and water pumping stations.



Reliability and efficiency Integrated essentials

Designed for outstanding levels of reliability and efficiency. Provides constant or adjustable speed in demanding applications.

Flexibility

For maximum flexibility, ABB wound rotor motors are designed for horizontal or vertical installation.





Cooling type

Water to air and Air to air cooling types are provided. The complete range of enclosed and cooling arrangement can be built on the same basic design using modular construction

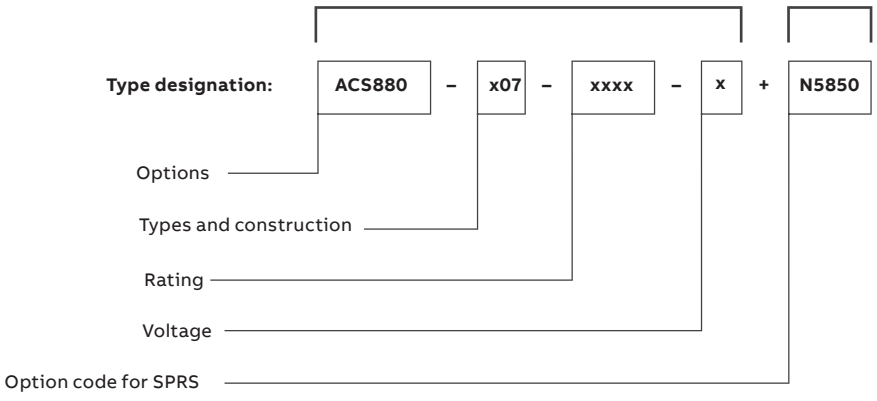
Packaged together

The motor and drive package is optimized and engineered based on customer‘s requirements. Packaging helps the customer in every phase of the project, from project creation to final



How to select a drive

You can specify your drives from the wide range of available options by type designation. Customer specific ones are added to the type designation using the corresponding + code.



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For more information, please contact
your local ABB representative or visit

www.abb.com/drives

3AXD50000297481 REV A (EN) 25.05-2019

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