VARIABLE SPEED MOTORS

Air cooled condenser motor and drive system
For industrial applications
New air cooling drive technology
Improves reliability, reduces maintenance, runs quieter and saves energy

ABB offers high-torque direct drive motors for air cooled condenser applications by combining the technologies of the field-proven and power-dense AC laminated frame. Baldor-Reliance® RPM AC motors have high performance permanent magnet (PM) salient pole rotor designs and the matched performance of an adjustable speed drive. The direct drive solution offers the benefits of variable speed control and eliminates the cost and maintenance required for traditional gearboxes. The fan couples directly to the motor and is controlled by a unique AC drive to provide optimal speed and air cooled condenser performance that runs quieter with reduced energy consumption. The drive is designed to accommodate the most common industrial communications protocols.

Direct drive RPM AC synchronous PM motor reduces maintenance costs
The RPM AC synchronous PM motor uses laminated finned frame construction to provide a highly efficient power dense package with flange mounting dimensions that can replace the gearbox in many conventional air cooled condenser applications. RPM AC is the right solution for operation inside the cooled condenser’s hot and dirty environment. The DPG-FV (drip-proof guarded force ventilated) and TEAO (totally enclosed air over) RPM AC air cooled condenser motor is designed for minimal maintenance. Bearings require lubrication only once per year. The electrical insulation system is manufactured using a VPI (vacuum pressure impregnation) process that ensures long life even in the most extreme environmental conditions. Condensation drains relieve any moisture that may collect inside the motor. No more changing gear oil or gear boxes.

ABB ACS880 air cooled condenser drive
The ABB ACS880 cooling condenser drive utilizes our Matched Performance philosophy to ensure trouble-free operation with the Baldor-Reliance RPM AC permanent magnet air cooled condenser motor. The drives also provide custom features for the air condenser industry including trickle current motor heating, locked motor rotor functionality to prevent windmilling when not enabled, de-ice mode, accelerometer feedback and RTD temperature feedback. Additionally, much complexity is reduced in the air cooled condenser drive by removing all general purpose drive parameters and only providing the necessary air cooled condenser drive parameters, allowing for easy configuration and start-up. The ABB air cooled condenser drive also provides a quick start assistance specifically for air cooled condenser tower applications making start-up simple and straightforward.
RPM AC direct drive air cooled condenser tower

Features and benefits

**Direct drive motor**
- Eliminates the need for a gearbox and coupling
- Reduces maintenance and provides improved reliability
- Eliminates contamination by eliminating gearbox oil and leakage
- Reduces power consumption
- Results in increased safety due to removal of rotating equipment
- Eliminates the alignment of mechanical components for quicker installation
- Reduce installation cost and increased system efficiency

**Bearing and seals**
- Oversized bearings to maintain longer bearing life exceeding $L_{10}$ 100,000 hours
- Tapered roller pair on opposite drive end and deep groove ball bearing on drive end
- Optional carrier bearing design with greater clearance: Only functions when the motor sees wind gusts greater than 50 mph
- Mobil SHC460 synthetic grease lubrication for long life
- Handles fan loads with improved reliability

**Motor features**
- Thermostats one per phase normally closed
- Heavy build external paint coating
- Proven insulation system technology used in offshore drilling applications
- Insulated opposite drive end bearing on FL440 and FL5800 frames (FL5800 also has insulated bearing on drive end)
RPM AC direct drive air cooled condenser tower
Adjustable speed control

- Designed specifically for the air cooled condenser industry and can be set at optimum speed point (+N5350)
- Sensor less permanent magnet motor control operates without an encoder or resolver
- Trickle heating eliminates need for motor space heaters
- Guaranteed compatibility due to the matched performance of the motor drive
- Allows for a soft start (controlled ramp)
- Saves energy and reduces mechanical stress on the system 30-60%
- Improves system reliability and extends life
- Reduces noise
- Trickle current for braking prevents fan windmilling when not in operation
- System resonance speed can be bypassed
- Optional drive care warranty provides a five-year warranty on the drive with a preventative maintenance on the drive at three years
Retrofit or new tower designs

A direct drive motor eliminates components by mounting the fan directly on the motor shaft.
Air cooled condenser frame

### Air cooled condenser motor matrix

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**Air cooled condenser, max torque per frame length**

- FL5800
- FL440
RPM AC air cooled condenser motor
Dimensions - DPFV FL440, FL5800 frame

Typical shaft down ACC DPFV motor dimensions

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<tr>
<th>Frame size</th>
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<th>“c”</th>
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Dimensions in inches (millimeters)

Shaft down ACC DPFV motor detail with typical fan
RPM AC air cooled condenser motor
Dimensions TEAO FL360, FL400 & FL440 frame

Typical shaft down ACC DPFV motor dimensions

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Dimensions in inches (millimeters)

Shaft down motor detail with typical fan
## Adjustable speed drive cooling tower models

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By optimizing motor speed, considerable energy can be saved. The entire air cooling condenser system must be designed for the “worst case” (or highest air flow) scenario. For optimum system performance, the fan may need to operate at reduced speed.

As the speed of the motor is decreased, the air flow drops in a corresponding linear fashion. So, for example, if the motor runs at only 50 percent speed, the air flow is correspondingly reduced to 50 percent of maximum air flow.

However, the input power to the motor varies with the cube of the motor speed. For example, if a motor is run at half speed, the power consumed by the motor is 12.5 percent, or 1/8 [i.e. (1/2)^3] of the power consumed at full speed. So, if the needed airflow can be achieved by running at half speed, it is possible to save a large amount of energy (see energy chart on the right).