Ultra-low harmonic drives for water and wastewater
5 to 400 hp

The ACQ580 ultra-low harmonic (ULH) drives provide all the features, benefits, and value of the ACQ580 platform in an unprecedented compact design that delivers unity power factor with 3% or less THiD.

By meeting the most stringent requirements of IEEE519, the ACQ580 ULH drive minimizes risk of electrical disturbance when operating on a back-up generator.

There’s no need to mitigate harmonics if you barely create them to begin with. It’s not a problem as ABB Ultra-low harmonic drives:

- Meet the most stringent recommendations of IEEE519 at the drive terminals.
- Are generator-friendly.
- Have a perfect 1.0 power factor (no leading power factor).
- Take up less space.
- Do not require external harmonic mitigation devices.
- Install easily with 3 wires in and 3 wires out.
- Reduce electrical network losses and improve transformer utilization.
- Supply full voltage to the motor in low line voltage conditions.
- Embody four generations of ABB ULH experience.
- Employ a common all-compatible user interface.
- Use familiar, menu-driven, simple text for programming.

Do you see

- Power factor penalties on your utility bill
- Generator voltage instability
- Sensitive electronic equipment operating erratically or failing
- Motors not connected to drives running hotter than expected
- Distribution transformers overheating
- Circuit breakers randomly tripping
- Fuses blowing unexpectedly
- Back-up generators seem larger than necessary
For all water industry applications

Offers built-in pump functionalities:

- Intelligent multi-pump control
- Sensorless flow calculation
- Level control
- Soft pipe fill
- Quick ramps
- Pump cleaning
- Dry pump protection

Technical data

<table>
<thead>
<tr>
<th>Power range</th>
<th>5 to 400 hp</th>
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<tbody>
<tr>
<td>Voltage range</td>
<td>3-phase, UN, = 380 to 480 V, +10%/-15%</td>
</tr>
<tr>
<td>Power factor (cosφ) at nominal load</td>
<td>1.0</td>
</tr>
<tr>
<td>Power loss</td>
<td>Approx. 2-3% of rated power</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60 Hz ±5%</td>
</tr>
<tr>
<td>Supported motor control</td>
<td>Scalar and vector</td>
</tr>
<tr>
<td>Supported motor types</td>
<td>Asynchronous motor, permanent magnet motor (vector), SynRM (vector)</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>ACQ580-31: UL Type 1 (IP21) as standard, UL Type 12 (IP55) as option, ACQ580-34: UL Type 00 (IP00)</td>
</tr>
<tr>
<td>Ambient conditions</td>
<td>ACQ580-31: -15°C to 40°C. No frost allowed. From +40°C to +50°C with derating 1% per 1°C, ACQ580-34: -15°C to 40°C. No frost allowed. From +40°C to +50°C with derating 1% per 1°C</td>
</tr>
<tr>
<td>Compliance</td>
<td>UL, cUL, CSA, CE, EAC, RCM</td>
</tr>
<tr>
<td>Harmonic performance</td>
<td>Harmonics are below the limits defined in IEEE519</td>
</tr>
<tr>
<td>Control connections</td>
<td>Two analog inputs, two analog outputs, six digital inputs including thermistor input, three relay outputs, EIA-485 Modbus RTU, safe torque off (STO), external 24 V DC supply input, USB via control panel</td>
</tr>
<tr>
<td>Optional I/O extension modules</td>
<td>External 24 V DC/AC and digital I/O extension (2 relay output and 1 x digital output), External 24 V and isolated PTC interface, External six 115/230V AC digital inputs and two relay outputs</td>
</tr>
<tr>
<td>Optional communication extension modules</td>
<td>EtherNet/IP, Modbus TCP, Profibus-DP, Profinet, DeviceNet</td>
</tr>
<tr>
<td>PC tools</td>
<td>Drive composer tool entry, available for free via ABB website, Drive composer tool pro</td>
</tr>
<tr>
<td>Control panel options</td>
<td>Hand-Off-Auto control panel as standard, Optional Bluetooth Hand-Off-Auto control panel, Control panels feature battery back-up</td>
</tr>
</tbody>
</table>

Harmonic Distortion

How do you meet IEEE 519?

Methods of managing harmonic distortion

<table>
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<tr>
<th>Active front end (ULH drive)</th>
<th>Ultra-Low Harmonic drive (ULH)</th>
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<tr>
<td>Typical input current distortion</td>
<td>3 - 5 %</td>
</tr>
<tr>
<td>18-pulse drive</td>
<td>3 - 10 %</td>
</tr>
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</table>

- Control line current to near sinusoidal waveform
- Low total distortion of current and voltage
- Meet most stringent standards (IEEE519) at drive terminals
- Not susceptible to unbalanced supply voltages and background voltage distortion

Multi-pulse rectifiers

Typical input current distortion 5 - 10 %

- Three rectifiers mean more parts and increased complexity
- Better harmonic performance than lower multi-pulse configurations
- Sensitive to network voltage imbalances

6 pulse rectifier, passive filter

Typical input current distortion 5 - 15 %

- Increases size and heat dissipation
- Harmonic performance is load-dependent
- Leading power factor can affect generator performance

6 pulse rectifier, input reactor

Typical input current distortion 35 - 45 %

- Reactors may be located on the AC line or a DC link choke in the drive
- May cause generator instability

6 pulse rectifier, no harmonic reduction

Typical input current distortion 80 - 120 %

- No harmonic reduction (e.g., line reactors, DC link choke or passive filter)
- Least expensive and simplest drive configuration
- Uses more current
- Causes generator instability

Harmonic Distortion

Ultra-Low Harmonic drive (ULH)

- Control line current to near sinusoidal waveform
- Low total distortion of current and voltage
- Meet most stringent standards (IEEE519) at drive terminals
- Not susceptible to unbalanced supply voltages and background voltage distortion

ABB Inc
Drives
16250 W. Glendale Drive
New Berlin, WI 53151

abb.com/drives

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