



ABB drives for water  
Low harmonic drives  
ACQ800-U31/37, 7.5 to 550 hp



# ACQ800-U31/37, low harmonic drives

## Overview

### Overview

A reliable system is critical to supplying, treating, and recycling water. The world trusts you to make good decisions and you take that responsibility seriously. When you use ABB Variable Frequency Drives (VFDs) we'll help safeguard your system to run efficiently and provide the value and dependability you demand.

Who you choose matters. That's why it's critical that you work with a company with experience in your industry and select ABB VFDs designed by the technology experts. ABB offers a broad range of harmonic reduction solutions, including Ultra-Low Harmonic (ULH) variable frequency drives, providing the most complete solutions for harmonic reduction.

The heart of the drive is DTC, Direct Torque Control, that provides high performance and significant benefits: e.g. accurate static and dynamic speed and torque control, high starting torque and use of long motor cables. Built in drive options make the installation work fast and easy. The robust enclosures and cabinets, with a wide range of enclosure classes, as well as power terminals, are designed for harsh environments.

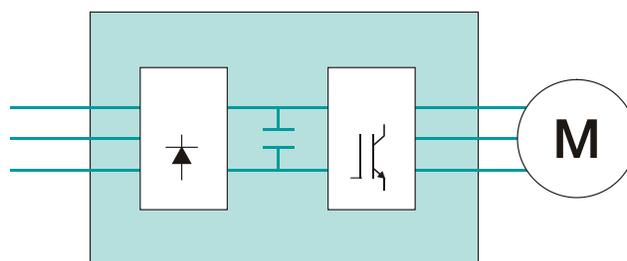
One of the most significant design criteria of ABB drives has been long lifetime. Wearing parts such as fans and capacitors have been selected accordingly. This means - together with extensive protection features - excellent reliability in demanding industrial applications.

### DTC Motor Control

Direct Torque Control (DTC) developed by ABB has improved motor control accuracy without the requirement of speed feedback device. Accurate speed and torque control of the manufacturing process optimizes the quality of the end product. No additional speed feedback is required when the ACQ800 with DTC is used.

### Single drives

The single drive configuration contains a rectifier, DC link and an inverter in one single AC drive unit.



The single drives are complete AC drives that can be installed without any additional cabinet or enclosure. The single drives are available as wall-mounted, free-standing and cabinet-built constructions. The standard protection class of the single drives is UL Type 1 and higher protection classes are available as an option.

### Type Code

This is the unique reference number that clearly identifies your drive by construction, power rating voltage and selected options. By type code you can specify your drives from the wide range of available options, customer specific ones are added to the type code using the corresponding + code.

# ACQ800-U31/37, low harmonic drives

## Direct Torque Control technology

### DTC Technology - key in the ACQ800 family

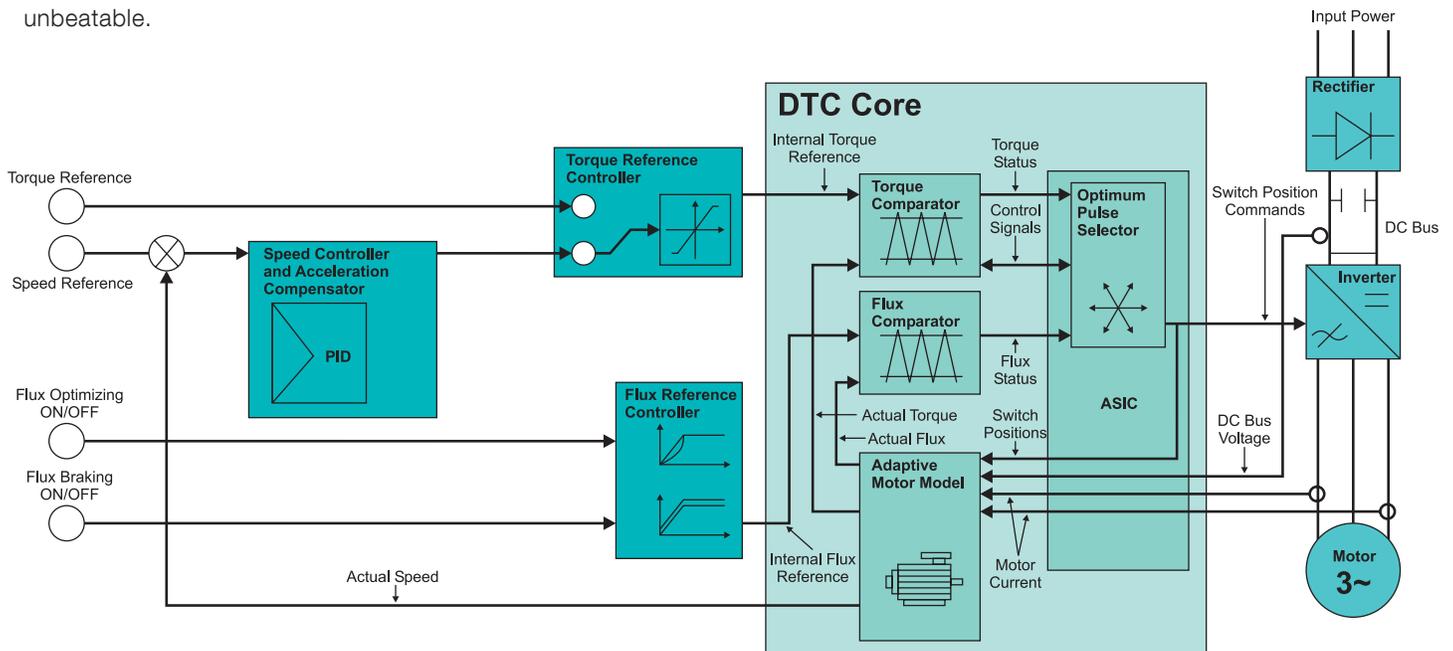
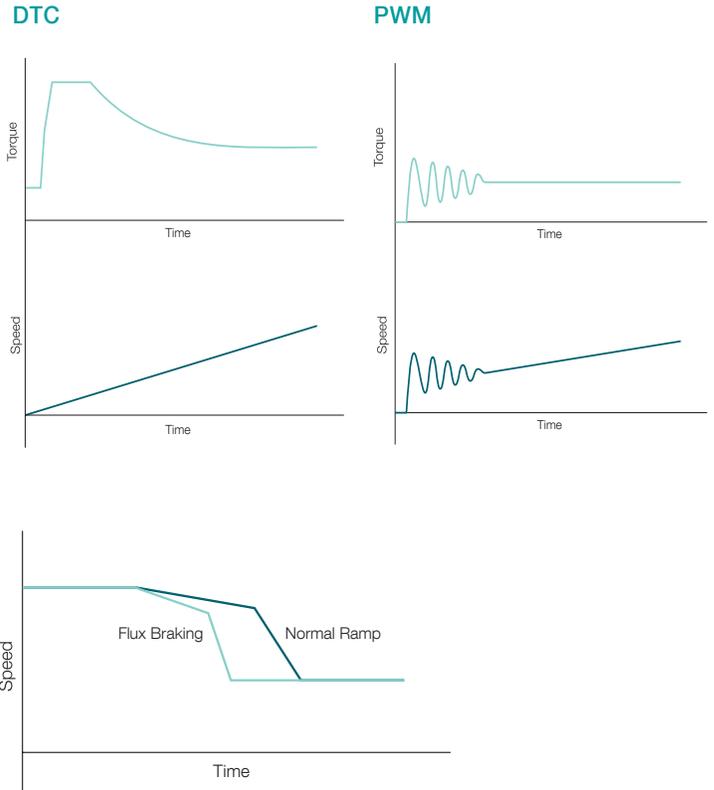
Direct Torque Control is an optimized motor control method for AC drives that allows direct control of all the core motor variables. This opens up AC drive capabilities never before realized and offers benefits for all applications.

### What is Direct Torque Control?

Direct Torque Control, DTC, is a revolutionary motor control method for AC drives which allows accurate control of both motor speed and torque without pulse encoder feedback from the motor shaft, down to zero speed. In DTC, stator flux and torque are used as primary control variables. The motor state calculations are updated by the high speed digital signal processor at 40,000 times a second in the advanced motor software model. Due to the continuous updating of the motor state and the comparison of the actual values to the reference values, every single switching in the drive is determined separately. This feature will always produce the optimal switching combination and can instantly react to dynamic changes such as load shocks or power interruptions. In DTC, there is no need for a separate voltage and frequency controlled pulse width modulator.

### Unequaled motor speed & torque control

Open loop dynamic speed control accuracy matches that of AC drives using closed loop flux vector control. The ACQ800 delivers static speed control accuracy of 0.1% to 0.5% of nominal speed - more than adequate for most industrial applications. In applications requiring even more precise speed regulation, an optional pulse encoder can be used. With an open loop torque step rise time of less than 5 milliseconds - compared to over 100 ms in AC drives using sensorless flux vector control - the ACQ800 AC drive is unbeatable.



# Managing Power Quality

## The Importance of Understanding the Effects of Harmonic Distortion

Any distorted voltage and current waveform that deviates from the ideal sinusoidal waveform presents the potential to harm electrical components, which can result in costly repairs and equipment downtime. Non-linear loads connected to the electrical supply in industrial and commercial facilities insert harmonics (waveform distortions) on the power distribution system. Common non-linear loads include solid state motor soft starters, variable speed drives, computers, electronic lighting, welding supplies and uninterruptible power supplies.

The impact of harmonic distortion can appear in many ways: it can cause distribution transformers and supply cables to overheat, resulting in insulation breakdown and failure; electronic displays and lighting may flicker; nuisance tripping of circuit breakers is possible; and damage can occur to electronic equipment, and may even distort readings provided by metering equipment.

The effects of harmonic distortion are not limited to the facilities where electrical equipment is installed. Situations where electrical equipment is installed in residential areas (pumping stations, waste water treatment plants, cooling towers, HVAC Systems) present the potential for equipment in residential and commercial buildings to be impacted -- and even damaged. The Institute of Electrical and Electronics Engineers (IEEE) has established a recommended practice -- IEEE 519-1992 -- which sets reasonable limits for harmonic current and voltage distortion for electrical power systems. This recommended practice provides the foundation for evaluating the level of harmonic distortion in a power distribution system, and the level of action required to mitigate the risks.

Industries such as water and waste water treatment, and HVAC, must meet local requirements to achieve low harmonic levels; this prevents disturbances to equipment in nearby residential properties. Typically, such electrical users need to meet the IEEE 519-1992.

Taking action to deal with harmonic distortion provides many benefits beyond those related to managing risk. Industries with high power consumption, like pulp and paper, metals, oil and gas refineries, cement and chemicals processing, have the opportunity to optimize the quality of power in the facilities by managing disturbances and losses caused by harmonics.

## Drives with Harmonic Reduction Solutions Built In

It is very important that professionals responsible for designing and maintaining electrical systems be aware of the potential issues related to harmonic distortion of their power distribution systems -- and know how to manage them in the most efficient and cost effective manner.

There are many factors and components that impact the overall quality of a power distribution system. Variable speed drives are among the many electrical devices included in that group. Manufacturers of variable speed drives offer a variety of answers to the question of how to reduce the level of distortion these devices produce. Most of these solutions involve adding large components like line reactors and special transformers to the variable speed drive installation that help to reduce the level of harmonic distortion. A brief overview of the available solutions is included on page 7.

ABB offers a broad range of harmonic reduction solutions as well. The most recent addition to this offering is the ACQ800 Ultra-low Harmonic variable speed drive – providing the best combination of harmonic reduction, package size and weight, and range of available features.



# Ultra-low Harmonic drive

## What is an Ultra-low Harmonic Drive?

An Ultra-low Harmonic (ULH) drive has switching IGBT semiconductors in the supply side, instead of a conventional diode bridge. The drive is able to control the line current to sinusoidal waveform. Additionally, the line filter used in an ultra-low harmonic drive typically is designed to attenuate high-order voltage harmonics to reach very low total distortion of both current and voltage.

## Benefits

Harmonic mitigation is built right into the ULH drive - eliminating the need for additional expensive and space-consuming components like line reactors and transformers. This concept ensures the drive meets the IEEE 519-1992 standard at the input terminals of the drive. The harmonic performance is independent of supply imbalance, unlike 12- and 18-pulse solutions, and avoids any concern related to network resonances. Total harmonic distortion of the drive is typically 3.5 – 4.5% of the nominal rating and the drive always operates with power factor of 1.

## Features

The ULH drive is available in both wall-mounted package and enclosed cabinet-built versions (depending on ratings and options selected).

The power ratings of the wall-mounted type start from 7.5 hp heavy-duty rating and go up to 125 hp normal-duty rating. It is available in the NEMA 1 protection class. The cabinet-built drive is available in the power range of 60 hp up to 550 hp, and with NEMA 1, NEMA 1 filtered and NEMA 12 protection class – easily configured and ordered using our standard product catalogs.

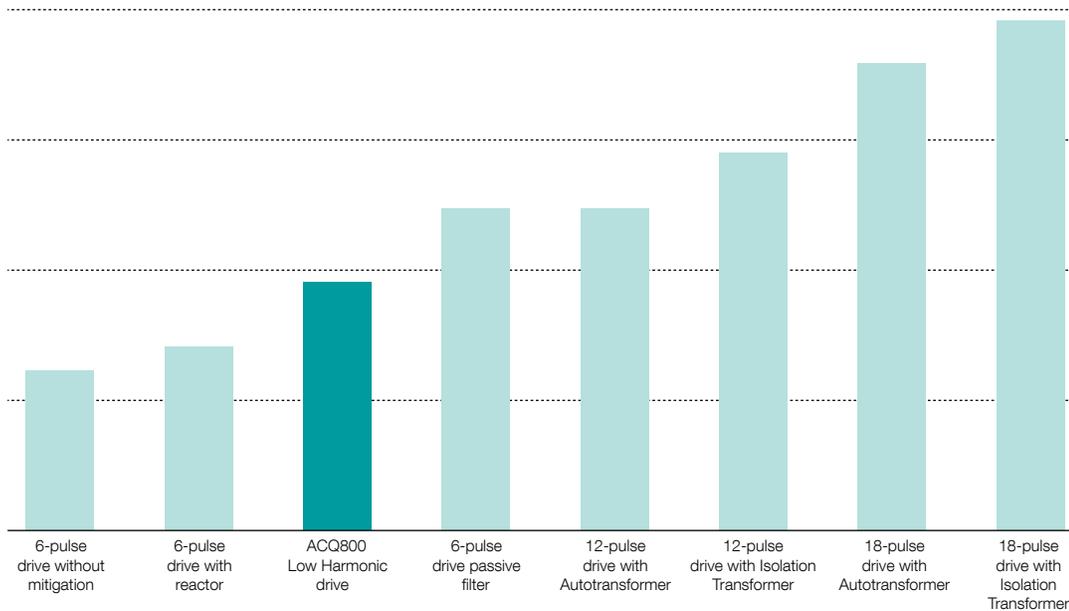
## Where it can be used

The ABB ACQ800 ULH drive is the ideal solution for those drive installations where low harmonic content is desired or mandated. Its performance and simplicity of installation make it suitable to a wide range of industries and applications. The most common applications for these drives are pumps, fans and compressors.

## Solution vs. Physical Footprint Comparison

Comparison of the overall footprint of the ACQ800 ULH drives vs. other available harmonic reduction solutions.

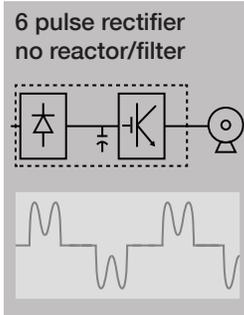
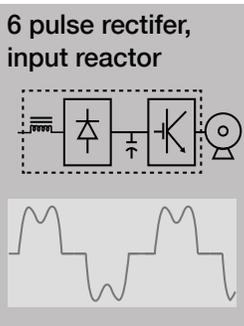
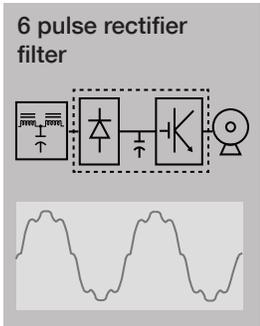
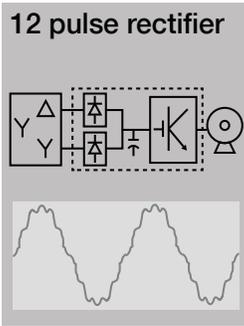
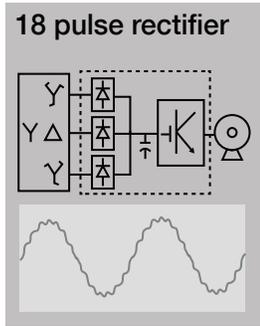
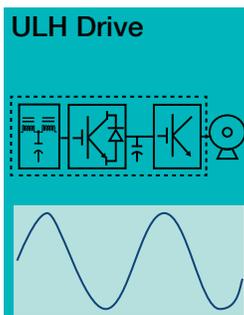
### Overall footprint comparison by solution



# Solution comparison

## Many options; one real solution

Each of the popular methods of harmonic-reducing variable speed drive packages is described below. All harmonic levels indicated are input current distortion measured at the input terminals at full load, the line impedance is 0.5%. A drive without a line reactor or DC link choke will have a current distortion of about 35-40%.

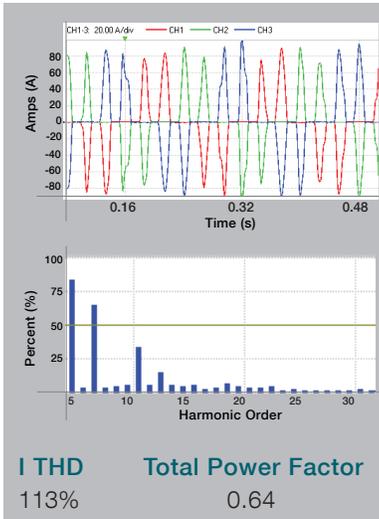
<p>6 pulse rectifier, no harmonic reduction</p>	<p><b>6 pulse rectifier no reactor/filter</b></p> 	<p>A 6-pulse drive without any harmonic reduction such as line reactors, dc link choke or passive filter is the least expensive and simplest drive configuration; typical input current distortion is 40 - 120%.</p>
<p>6 pulse rectifier, input reactor or filter</p>	<div style="display: flex; justify-content: space-around;"> <div data-bbox="267 892 511 1218"> <p><b>6 pulse rectifier, input reactor</b></p>  </div> <div data-bbox="527 892 787 1218"> <p><b>6 pulse rectifier filter</b></p>  </div> </div>	<p>6-pulse drive with reactors – Reactors may be located either at AC line, or in DC link of the drive; typical input current distortion is 25 – 35%.</p> <p>6-pulse drives with passive filter – This solution adds a low-pass filter in series with the drive. This solution can cause load-dependent voltage issues and potential power factor issues; typical input current distortion is 7-12%.</p>
<p>Multi-pulse rectifiers</p>	<div style="display: flex; justify-content: space-around;"> <div data-bbox="267 1291 511 1617"> <p><b>12 pulse rectifier</b></p>  </div> <div data-bbox="527 1291 787 1617"> <p><b>18 pulse rectifier</b></p>  </div> </div>	<p>18-pulse drive – Same operation principle as the 12-pulse drive. This design has three rectifiers resulting in a higher part count and greater complexity. Harmonic performance is better than an 12-pulse drive but still sensitive to network voltage imbalance.</p>
<p>ACQ800 ULH drive</p>	<p><b>ULH Drive</b></p> 	<p>Ultra-low Harmonic drive (ULH) – This solution is configured to enable the drive to control the line current to near sinusoidal waveform quality. The active front end used in the ULH drive is designed to reach very low total distortion of both current and voltage. Simply, the drive package meets the IEEE 519 standard at the input terminals, and is not susceptible to unbalanced supply voltages.</p> <p>Typical input current distortion is 3 – 5%.</p>

# Measurement results

## Technical Performance Comparison

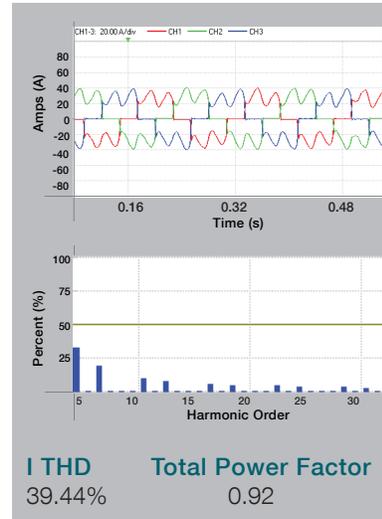
The following graphics indicate the actual level of harmonic distortion produced by the variable speed drive types mentioned. The results confirm that the ULH produces the least harmonic distortion of all solutions tested. Note that the actual level of harmonic distortion will vary from installation to installation due to the site conditions. The relative comparison and results between each of these variable speed drive types on the same system will be the same.

### 6-pulse drive, no harmonic reduction



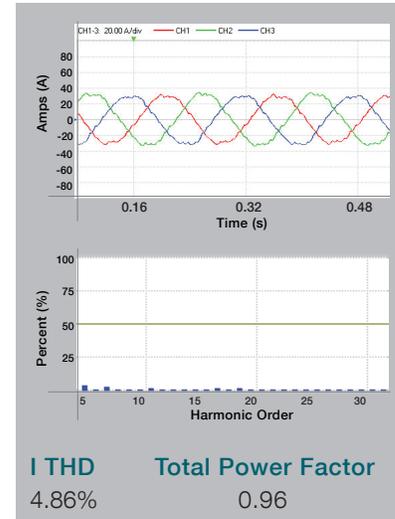
6-pulse drives without any harmonic reduction have a dramatic impact on the power distribution system – in this case the level of input current distortion is 56% and reduces the power factor to 0.87.

### 6-pulse drive with reactors



The level of harmonic distortion is reduced when reactors are added to 6-pulse drives, but is still significant. Total power factor is also improved.

### 18-pulse drive

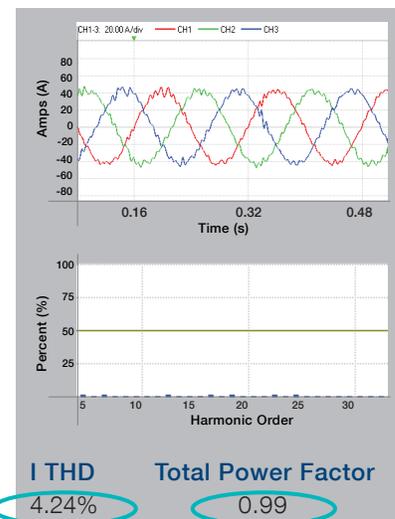


An 18-pulse solution offers very good reduction of harmonic distortion. However, this solution has considerable size and weight disadvantages due to the special phase-shifting transformers that are used.

### Ultra-low Harmonic drive

The Ultra-low Harmonic drive solution provides the best overall management of harmonic distortion of all solutions tested. Not only are the current and voltage distortions minimized, but the power factor is controlled to operate at unity (1.0), minimizing the total current used by the drive.

The ULH drive is the ideal solution for those drive installations where low harmonic content is desired or mandated. Its footprint is generally smaller than comparable stand-alone installations that use additional bolt-on harmonic reduction means. Its performance and simplicity of installation make it suitable for the water and wastewater industry, which includes applications such as: pumps, blowers, and compressors.



# Technical specifications

## Low harmonic drives, ACQ800-U31/-37

Mains connection	
Voltage and power range	3-phase, $U_{2IN} = 208$ to $240$ V, $\pm 10\%$ , except -37 3-phase, $U_{5IN} = 380$ to $500$ V, $\pm 10\%$ 3-phase, $U_{7IN} = 525$ to $690$ V, $\pm 10\%$ , except -37 (600 V UL, CSA)
Short Circuit Current Rating (SCCR)	ACQ800-U31 = 65ka ACQ800-37 = 100ka
Frequency	48 to 63 Hz
Nominal Impedance	3% Nominal Impedance R4 and greater, AC Reactor
Power factor ACQ800-U31,-37	$\cos\phi 1 = 1$ (fundamental) $\cos\phi = 0.99$ (total)
Efficiency (at nominal power) ACQ800-U31,-37	97%
Motor connection	
Voltage	3-phase output voltage $0 \dots U_{2IN}, U_{5IN} / U_{7IN}$
Frequency	$0 \dots \pm 300$ Hz
Field weakening point	$8 \dots 300$ Hz
Motor control	ABB's exclusive Direct Torque Control (DTC)
Torque control	Torque step rise time
Open loop	<5 ms with nominal torque
Closed loop	<5 ms with nominal torque
Open loop	Non-linearity:
Closed loop	$\pm 4\%$ with nominal torque $\pm 1\%$ with nominal torque
Speed control	Static accuracy
Open loop	10% of motor slip
Closed loop	0.01% of nominal speed
Open loop	Dynamic accuracy
Closed loop	0.3...0.4% sec. with 100% torque step 0.1...0.2% sec. with 100% torque step

Environmental	
Ambient temperature	
Transport	-40...+70°C
Storage	-40...+70°C
Operation	-15...+50°C, no frost allowed 40...50°C at reduced output current(1% / 1°C)
Cooling method	Dry clean air
Altitude	
0...1000 m	without derating
1000...4000 m	with derating ~ (1% / 100 m) (690 V units 1000...2000 m with derating)
Relative humidity	5 to 95%, no condensation allowed
Protection class	
UL Type 1	standard for -U31,-37
UL Type 1 filtered	option for -37
UL Type 12	option for -37
Paint color	-37: RAL 7035 -U31: NCS 1502-Y
Contamination levels	No conductive dust allowed
Storage	IEC60721-3-1, Class 1C2 (chemical gases), Class 1S2 (solid particles)
Transportation	IEC60721-3-2, Class 2C2 (chemical gases), Class 2S2 (solid particles)
Operation	IEC60721-3-3, Class 3C1/3C2* (chemical gases), Class 3S2 (solid particles)
	C = chemically active substances S = mechanically active substances

Product compliance
UL & cUL (508A or 508C) and CSA C22.2 NO.14-95, C-Tick, GOST R NEC 430.126(A)(2) Motor Overtemperature Protection Quality assurance system ISO 9001 and Environmental system ISO 14001 CE (Available) Low Voltage Directive 73/23/EEC with amendment 93/68/EEC Machinery Directive 98/37/EC EMC Directive 89/336/EEC with amendment 93/68/EEC

EMC (according to EN 61800-3)
2nd environment, unrestricted distribution category C3 as standard in -37 (frame sizes R7i-nxR8i), option in the others 1st environment, restricted distribution category C2 as option up to 1000 A input current

# ACQ800-U31/37, low harmonic drives

## Features

Features	Benefits	
<b>Compact and complete</b>		
<b>Compact size, everything integrated</b>	Less space and installation work required.	No need to install extra components such as input chokes or EMC filter.
<b>Built in harmonic filter in all ACQ800 drives</b>	Low harmonics, meaning less interference and less heating in cables and transformers.  Filter also protects the drive from line side transients.	For the lowest harmonic level, ACQ800-U31/37 offers almost a harmonic free solution.
<b>Wide range of options available</b>	Standard solutions available from ABB to meet most customers application needs.	
<b>User interface</b>		
<b>User friendly customer interface</b>	Easy and fast commissioning and operation.	Clear, alphanumeric display with start-up assistant that guides through the start-up procedure.  Easy to use PC tools available for commissioning, maintenance, monitoring and programming.
<b>Versatile connections and communications</b>	Standard I/O covers most requirements.  Connectable to commonly used fieldbuses.	Extensive standard and optional I/O.
<b>Extensive programmability</b>	Flexibility. Possible to replace relays or even a PLC in some applications.	Two levels of programmability: 1. Parameter programming (standard) 2. Adaptive programming (free block programming) : - standard feature - more blocks available as options - all I/Os are programmable
<b>Design</b>		
<b>Wide power and voltage range</b>	One product series can be used to meet all application needs, meaning less training and spare parts and standardized interface to drives.	7.5 to 550 hp 208 to 690 VAC
<b>Wide range of robust enclosures available</b>	Industrial suitable solutions available for different environments	UL Type 1, UL Type 1 filtered, UL Type 12
<b>Robust main circuit design</b>	Suitable for heavy industrial use.  Reliable.  Long motor cables can be used without extra output filters.	Components dimensioned for heavy duty and long lifetime.  Advanced thermal model allows high overloadability
<b>Extensive protection features</b>	Enhanced reliability, fewer process interruptions.  Possibility to also protect motors and process.	Several adjustable limits to protect other equipment included.
<b>Galvanic isolation of I/O</b>	Safe and reliable operation without separate isolators and relays.	Isolated input signals and relay outputs as standard.
<b>All terminals designed for industrial use</b>	Sufficient size even for large aluminum cables.  No need for special tools in I/O cabling.	
<b>Worldwide approvals: CE, UL, cUL, CSA, C-Tick, GOST R</b>	Products that can be used everywhere in the world.	

# ACQ800-U31/37, low harmonic drives

## Features

Features	Benefits	
<b>Right performance for every application</b>		
<b>DTC, accurate dynamic and static speed and torque control</b>	Excellent process control even without speed feedback device - improved product quality, productivity, reliability and lower investment cost.	
<b>DTC - allows high overloadability and gives high starting torque</b>	Reliable, smooth start without overdimensioning the drive.	
<b>DTC, fast control</b>	No unnecessary trips or process interruptions	Fast reaction to load or voltage variations prevents tripping.  Rides through power interruptions by using kinetic energy of the load.
<b>DTC, flux optimization and sophisticated motor model</b>	Excellent motor and drive efficiency - cost savings for non-dynamic applications like pumps or fans.	Optimal flux in the motor reduces losses on applications where  Dynamic Response requirements are minimal.
<b>DTC, mechanics friendly</b>	Less stress for mechanics improves reliability.	No shock torques.  No torque ripple - minimized risk for torsional vibration.  Active oscillation damping
<b>DTC, line supply control</b>	High performance and robust control in active supply unit with programmable power factor	Applies for ACQ800-U31 and ACQ800-37
<b>Made by ABB</b>		
<b>Global market leader in AC drives.</b>	Well proven, safe and reliable solutions.	
<b>Long experience.</b>	Application know-how.	
<b>World wide service and support network</b>	Professional support available around the world	

# Low harmonic drive, ACQ800-U31

## Simple low harmonic solution

There is increasing concern among end users and power companies about the harmful effects of harmonics. Harmonic distortion may disturb or even damage sensitive equipment connected in the same environment. Harmonic standards are thus becoming stricter and there is a growing demand for low harmonic solutions.

The ACQ800-U31 drive offers an easy solution to the problem of harmonics. The solution itself is incorporated in the drive, eliminating the need for any additional filtering equipment or complicated and large multi-pulse transformer arrangements.

## Meets the strictest standards

The ACQ800-U31 eliminates low order harmonics with the active converter controlled with DTC, and high order harmonics with an LCL line filter. The result is exceptionally low harmonic content in the network; exceeding the requirements set by standard IEC61000-3-2 at the drive input terminals even on the weakest AC line network. The ACQ800-U31 provides you with a simple, compact and complete solution to meet stringent power quality standards.

## Beats external solutions

The ACQ800-U31 does not require a dedicated multi-pulse transformer and thus is simpler in terms of cabling arrangements and requires less floor space. Harmonic performance is better than with 12- and 18-pulse solutions. Passive or active external filtering devices are avoided with the ACQ800-U31, making the solution compact and simple. Other advantages of the ACQ800-U31 is that it always operates with unity power factor 1 and is impervious to AC Line Voltage imbalances up to and over 3%. The system efficiency is also better than 12 and 18-pulse solutions due to the simplified transformer.

## Main standard features

- Meets IEC61000-3-2 at Drive input terminals
- Wall mounting
- Compact design
- UL Type 1 protection class
- Built in low harmonic LCL filter
- Coated boards
- Extensive, programmable I/O
- Long lifetime cooling fan and capacitors
- Inputs galvanically isolated
- 3 I/O and fieldbus extension slots inside
- Alphanumeric multilingual control panel with a start-up assistant feature

## Options for ACQ800-U31

- EMC filter for 1<sup>st</sup> environment, restricted distribution according to EN 61800-3
- EMC filter for 2<sup>nd</sup> environment, unrestricted distribution according to EN 61800-3
- Analog and digital I/O extension modules
- Fieldbus modules



# Ratings, types, and voltages

## Low harmonic drives, ACQ800-U31

3-phase supply voltage 208, 220, 230, 240. The power ratings are valid at nominal voltage, 240Vac (50 & 60Hz)

Type code	Frame size	Input A	I <sub>max</sub> A	Normal Duty		Heavy-duty use		Noise Level dBA	Air flow ft <sup>3</sup> /min	Heat Dissipation BTU/hr
				I <sub>2N</sub> A	P <sub>N</sub> hp	I <sub>2HD</sub> A	P <sub>HD</sub> hp			
ACQ800-U31-0011-2	R5	32	52	32	10	26	7.5	70	206	1730
ACQ800-U31-0016-2	R5	44	68	45	15	38	10	70	206	2380
ACQ800-U31-0020-2	R5	55	90	56	20	45	10	70	206	3110
ACQ800-U31-0025-2	R5	70	118	69	25	59	15	70	206	3760
ACQ800-U31-0030-2	R5	82	144	83	30	72	20	70	206	4500
ACQ800-U31-0040-2	R6	112	168	114	40	84	25	73	238	5420
ACQ800-U31-0050-2	R6	140	234	143	50	117	30	73	238	7260
ACQ800-U31-0060-2	R6	157	264	157	60	132	40	73	238	8650

3-phase supply voltage 380, 400, 415, 460, 480, 500. The power ratings are valid at nominal voltage, 480Vac 60Hz

Type code	Frame size	Input A	I <sub>max</sub> A	Normal Duty		Heavy-duty use		Noise Level dBA	Air flow ft <sup>3</sup> /min	Heat Dissipation BTU/hr
				I <sub>2N</sub> A	P <sub>N</sub> hp	I <sub>2HD</sub> A	P <sub>HD</sub> hp			
ACQ800-U31-0020-5	R5	29	52	29	20	25	15	70	206	2240
ACQ800-U31-0025-5	R5	33	61	34	25	30	20	70	206	2600
ACQ800-U31-0030-5	R5	44	68	45	30	37	25	70	206	3420
ACQ800-U31-0040-5	R5	54	90	55	40	47	30	70	206	4140
ACQ800-U31-0050-5	R5	65	118	67	50	57	40	70	206	4960
ACQ800-U31-0060-5	R5	76	144	78	60	62	50	70	206	5980
ACQ800-U31-0070-5	R6	112	168	114	75	88	60	73	238	8030
ACQ800-U31-0100-5	R6	129	234	132	100	114	75	73	238	9570
ACQ800-U31-0120-5	R6	145	264	156	125	125	100	73	238	11620

3-phase supply voltage 525, 575, 600. The power ratings are valid at nominal voltage, 575Vac 60Hz

Type code	Frame size	Input A	I <sub>max</sub> A	Normal Duty		Heavy-duty use		Noise Level dBA	Air flow ft <sup>3</sup> /min	Heat Dissipation BTU/hr
				I <sub>2N</sub> A	P <sub>N</sub> hp	I <sub>2HD</sub> A	P <sub>HD</sub> hp			
ACQ800-U31-0060-7	R6	53	62	54	50	43	40	73	238	5980
ACQ800-U31-0070-7	R6	73	79	75	60	60	50	73	238	8030
ACQ800-U11-0100-7	R6	86	99	88	75	71	60	73	238	9570

UL Type 1				
Frame size	Height (in)	Width (in)	Depth (in)	Weight (lbs)
R5	32.1	10.4	15.4	143
R6	38.2	11.8	17.3	220.5

### NOTES:

- I<sub>max</sub> current available for 10 seconds at start.
- I<sub>2N</sub> continuous base current at 40°C (104°F). Overload cycle 110% I<sub>2N</sub> for 1 minute / 5 minutes allowed.
- I<sub>2hd</sub> continuous base current at 40°C (104°F). Overload cycle 150% I<sub>2hd</sub> for 1 minute / 5 minutes allowed.
- Current ratings do not change with different supply voltages.
- Horsepower ratings are based on NEMA motor ratings for typical 4-pole motors (1800 rpm). Check motor nameplate current for compatibility.

# Low harmonic drive, ACQ800-37

## Simple low harmonic solution

There is increasing concern among end users and power companies about the harmful effects of harmonics. Harmonic distortion may disturb or even damage sensitive equipment connected in the same environment. Harmonic standards are thus becoming stricter and there is a growing demand for low harmonic solutions.

The ACQ800-37 drive offers an easy solution to the problem of harmonics. The solution itself is incorporated in the drive, eliminating the need for any additional filtering equipment or complicated and large multi-pulse transformer arrangements.

## Meets the strictest standards

The ACQ800-37 eliminates low order harmonics with the active converter controlled with DTC, and high order harmonics with an LCL line filter. The result is exceptionally low harmonic content in the network; exceeding the requirements set by standard IEEE519 at the drive input terminals even on the weakest AC line network. The ACQ800-37 provides you with a simple, compact, and complete solution to meet stringent power quality standards.

## Beats external solutions

The ACQ800-37 does not require a dedicated multi-pulse transformer and thus is simpler in terms of cabling arrangements and requires less floor space. Harmonic performance is better than both 12- and 18-pulse solutions. Passive or active external filtering devices are avoided with the ACQ800-37, making the solution compact and simple. Other advantages of the ACQ800-37 is that it always operates with unity power factor 1 and is impervious to AC line voltage imbalances up to and over 3%. The system efficiency is also better than 12 and 18-pulse solutions due to the simplified transformer.

## Extensive range of features

In line with other ACQ800 cabinet-built drives, the ACQ800-37 offers a wide variety of standardized configurations to adapt to different application requirements.

## Main standard features

- Meets IEEE519-1992 at Drive input terminals
- Compact design
- UL Type 1 protection class
- Built in low harmonic LCL filter
- EMC filter for 2<sup>nd</sup> environment, unrestricted distribution according to EN 61800-3
- Main switch with aR fuses
- Line contactor
- Coated boards
- Extensive, programmable I/O
- Long lifetime cooling fan and capacitors
- Inputs galvanically isolated
- 3 I/O and fieldbus extension slots inside
- Alphanumeric multilingual control panel with a start-up assistant feature

## Options for ACQ800-37

- Analog and digital I/O extension modules
- Customer terminal block
- Fieldbus modules
- UL Type 1 Filtered or UL Type 12 enclosure classes
- Output for motor fan
- Bottom entry and exit of cables
- 1 or 2 thermistor relays
- 3, 5 or 8 PT100 relays

# Ratings, types, and voltages

## Low harmonic drives, ACQ800-37

3-phase supply voltage 380, 400, 415, 460, 480, 500. The power ratings are valid at nominal voltage, 480Vac 60Hz

Type code	Frame size	Input A	$I_{max}$ A	Normal Duty		Heavy-duty use		Noise Level dBA	Air flow ft <sup>3</sup> /min	Heat Dissipation BTU/hr
				$I_{2N}$ A	$P_N$ hp	$I_{2HD}$ A	$P_{HD}$ hp			
ACQ800-37-0070-5+C129	R6	112	168	114	75	88	60	73	295	8200
ACQ800-37-0100-5+C129	R6	129	234	132	100	114	75	73	295	9600
ACQ800-37-0120-5+C129	R6	145	264	156	125	125	100	73	295	11600
ACQ800-37-0170-5+C129	R7i	180	291	192	150	156	125	74	765	20500
ACQ800-37-0210-5+C129	R7i	220	355	240	200	183	150	74	765	27300
ACQ800-37-0260-5+C129	R8i	270	438	302	250	226	150	75	1860	30700
ACQ800-37-0320-5+C129	R8i	329	530	361	300	273	200	75	1860	37600
ACQ800-37-0400-5+C129	R8i	410	660	437	350	340	250	75	1860	47800
ACQ800-37-0460-5+C129	R8i	473	762	504	400	393	300	75	1860	54700
ACQ800-37-0510-5+C129	R8i	536	863	571	450	445	350	75	1860	61500
ACQ800-37-0610-5+C129	R8i	630	1016	672	550	524	400	75	1860	78600

Frame size	Width in	Height		Depth top entry/exit <sup>B)</sup> in	Weight lb
		UL Type 1 in	UL Type 12 in		
R6	16.9	83.9	91.1	25.4	550
R7i	24.8	83.9	91.1	25.4	880
R8i	48.4	83.9	91.1	25.4	2090

### NOTES:

$I_{max}$  current available for 10 seconds at start.

$I_{2N}$  continuous base current at 40°C (104°F). Overload cycle 110%  $I_{2N}$  for 1 minute / 5 minutes allowed.

$I_{2hd}$  continuous base current at 40°C (104°F). Overload cycle 150%  $I_{2hd}$  for 1 minute / 5 minutes allowed.

- Current ratings do not change with different supply voltages.

- The rated current of the ACQ800 must be greater than or equal to the rated motor current to achieve the rated motor power given in the table.

- Horsepower ratings are based on NEMA motor ratings for typical 4-pole motors (1800 rpm). Check motor nameplate current for compatibility.



# EMC filter options

## EMC - Electromagnetic Compatibility and modules

The electrical/electronic equipment must be able to operate without problems within an electromagnetic environment. This is called immunity. The ACQ800 is designed to have adequate immunity against interference from other equipment. Likewise, the equipment must not disturb or interfere with any other product or system within its locality. This is called emission. Each ACQ800 model can be equipped with an inbuilt filter to reduce high frequency emission.

## EMC standards

The EMC product standard [EN 61800-3 (1996) + Amendment A11 (2000)] covers the requirements stated for drives within the EU. The new revision of EN 61800-3 (2004) product standard can be applied from now on, but latest from 1 October 2007. In some cases other standards may be applicable. The emission limits are comparable according to the following table, EMC standards.

## Selecting an EMC filter

The following table gives the correct filter selection.

### EMC standards

EN 61800/A11, (2000), product standard	EN 61800-3 (2004), product standard	EN 55011, product family standard for industrial, scientific and medical (ISM) equipment	EN 6100-6-4, generic emission standard for industrial environments	EN 61000-6-3, generic emission standard for residential, commercial and light-industrial environment
1 <sup>st</sup> environment, unrestricted distribution	Category C1	Group 1 Class B	Not applicable	Applicable
1 <sup>st</sup> environment, restricted distribution	Category C2	Group 1 Class A	Applicable	Not applicable
2 <sup>nd</sup> environment, unrestricted distribution	Category C3	Group 2 Class A	Not applicable	Not applicable
2 <sup>nd</sup> environment, restricted distribution	Category C4	Not applicable	Not applicable	Not applicable

Type	Voltage	Frame sizes	1 <sup>st</sup> environment, restricted distribution, grounded network (TN)	2 <sup>nd</sup> environment, grounded network (TN)	2 <sup>nd</sup> environment, floating network (IT)
800-U31	230-575	R5-R6	+E202	+E200	-
800-37	500	R6	--	--	--
	500	R7i-R8i	--	standard	standard

# Standard user interface

## Control panel

The industrial drive control panel has a multilingual alphanumeric display (4 lines x 20 characters) with plain text messages in 14 languages.

The control panel is removable and can be mounted on the drive enclosure or remotely.

```
1 L -> 1242.0 RPM 1
SPEED 1242.0 RPM
CURRENT 76.00 A
TORQUE 86.00 %
```

### Start-up assistant

Easy commissioning with the start-up assistant. The start-up assistant actively guides you through the commissioning procedure step by step. It also has a unique on-line help function.

```
MOTOR SETUP 4/10
MOTOR NOM CURRENT P
(75.5 A)
ENTER: OK RESET: BACK
```

### Parameter copying

Parameter copy feature allows all drive parameters to be copied from one frequency converter to another simplifying commissioning.

```
1 L-> 1242.0 RPM 1
UPLOAD <=<=<=
DOWNLOAD =>=>=>
CONTRAST 4
```

### Actual value display

The control panel can display three separate actual values simultaneously.

### Centralized control

One panel can control up to 31 drives.

```
-> -> <- ->
1 21 40 100
->
111
```

Examples of these are:

- Motor speed
- Frequency
- Current
- Torque
- Power
- References
- DC bus voltage
- Output voltage
- Heatsink temperature
- Operating hours
- Kilowatt hours
- I/O status

### Easy programming

Parameters are organized into groups for easy programming.

```
1 L -> 1242.0 RPM 1
11 REFERENCE SELECT
3 EXT REF 1 SELECT
All
```

### Fault memory

A built in fault memory stores information relating to the last 64 faults, each with a time stamp.

```
1 L-> 1242.0 RPM 1
2 LAST FAULT
OVERVOLTAGE
1121 H 1 MIN
```

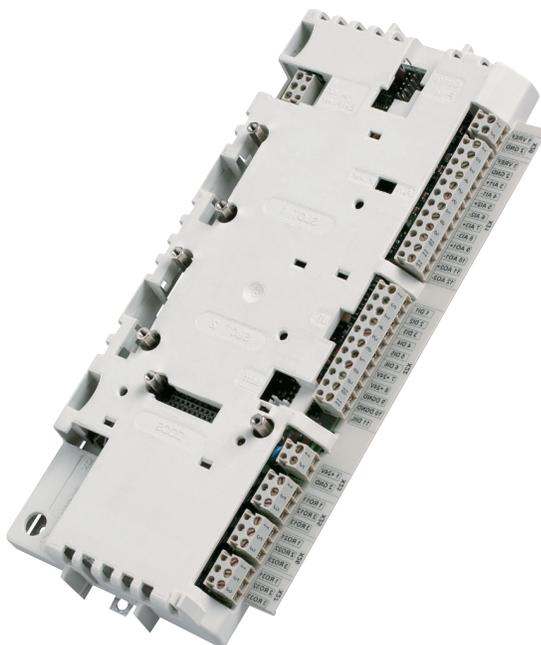
# Standard user interface

## Standard I/O

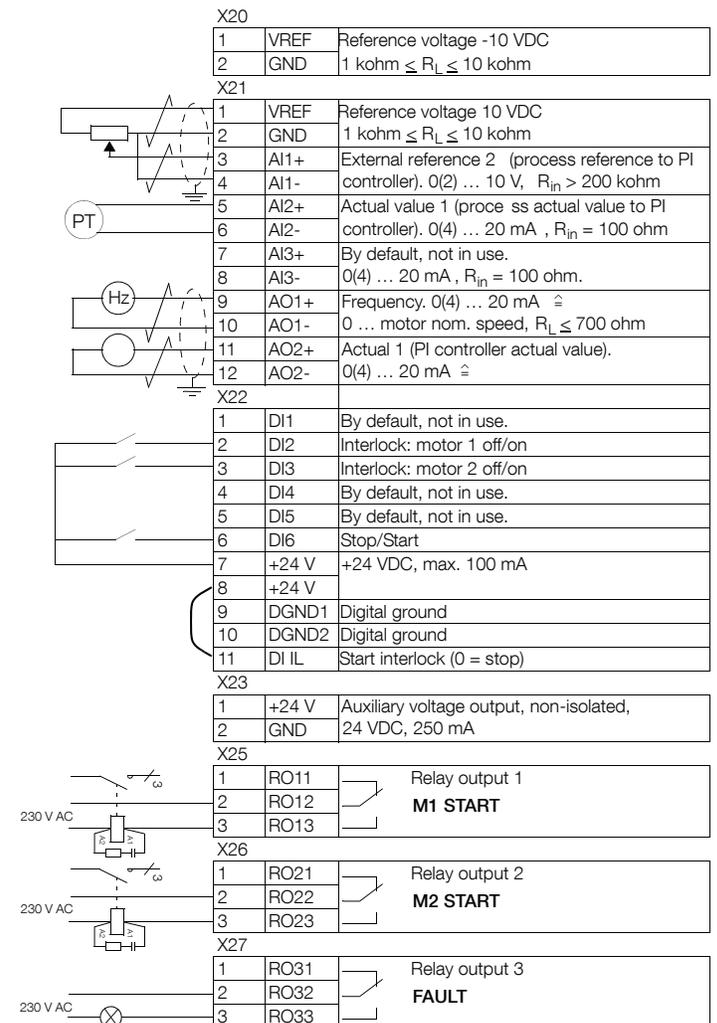
Analog and digital I/O channels are used for different functions such as control, monitoring and measurement purposes (e.g. motor temperature). In addition, optional I/O extension modules are available providing additional analog or digital I/O connections.

### Standard I/O on RMIO-01 Board

- 3 analog inputs: differential, common mode voltage  $\pm 15$  V, galvanically isolated as a group.
  - One  $\pm 0(2) \dots 10$  V, resolution 12 bit
  - Two  $0(4) \dots 20$  mA, resolution 11 bit
- 2 analog outputs:
  - $0(4) \dots 20$  mA, resolution 10 bit
- 7 digital inputs: galvanically isolated as a group (can be split in two groups)
  - Input voltage 24 V DC
  - Filtering (HW) time 1 ms
- 3 digital (relay) outputs:
  - Form C contacts
  - 24 V DC or 115/230 V AC
  - Max. continuous current 2 A
- Reference voltage output:
  - $\pm 10$  V  $\pm 0.5\%$ , max. 10 mA
- Auxiliary power supply output:
  - $+24$  V  $\pm 10\%$ , max. 250 mA



Below are the standard drive control I/O of the ABB low harmonic drive for the PFC TRAD macro. For other ACQ800 application macros the default functions may be different.



# Additional I/O options

Standard I/O can be extended by using analog and/or digital extension modules which are mounted in the slots on the control board. The control board has two slots available for extension modules. More extension modules can be added with the I/O extension adapter which has three additional slots. The available number and combination of I/O's depends on the control software used. The standard application software supports 2 analog and 2 digital extension modules.

## Optional I/O

Analog I/O extension module RAIO-01 (+L500)

- 2 analog inputs: galvanically isolated from 24 V supply and ground
  - $\pm 0(2)\dots 10$  V,  $0(4)\dots 20$  mA or  $\pm 0\dots 2$  V, resolution 12 bits
- 2 analog outputs: galvanically isolated from 24 V supply and ground
  - $0(4)\dots 20$  mA, resolution 12 bit

Digital I/O extension module RDIO-01 (+L501)

- 3 digital inputs: individually galvanically isolated
  - Signal level 24 to 250 V DC or 115/230 V AC
- 2 relay (digital) outputs:
  - Form C contacts
  - 24 V or 115/230 V AC
  - Max. 2 A



# Communications options

## Fieldbus control

ABB drives have connectivity to most major automation systems. This is achieved with a dedicated gateway concept between the fieldbus systems and ABB drives.

The fieldbus gateway module can easily be mounted inside the drive. Because of the wide range of fieldbus gateways, your choice of automation system is independent of your decision to use first-class ABB AC drives.

### Manufacturing flexibility

#### Drive control

The drive control word (16 bit) provides a wide variety of functions from start, stop and reset to ramp generator control. Typical setpoint values such as speed, torque and position can be transmitted to the drive with 15 bit accuracy.

#### Drive monitoring

A set of drive parameters and/or actual signals, such as torque, speed, position, current etc., can be selected for cyclic data transfer providing fast data for operators and the manufacturing process.

#### Drive diagnostics

Accurate and reliable diagnostic information can be obtained via the alarm, limit and fault words, reducing the drive downtime and therefore the downtime of the manufacturing process.

#### Drive parameter handling

Total integration of the drives in the production process is achieved by single parameter read/write up to complete parameter set-up or download.

### Reduced installation and engineering effort

#### Cabling

Substituting the large amount of conventional drive control cabling with a single communication cable reduces costs and increases system reliability.

#### Design

The use of fieldbus control reduces engineering time at installation due to the modular structure of the hardware and software.

#### Commissioning and assembly

The modular machine configuration allows pre-commissioning of single machine sections and provides easy and fast assembly of the complete installation.

### Currently available gateways

Fieldbus	Protocol	Device profile	Baud rate
PROFIBUS (+K454)	DP, DPV1	PROFdrive ABB Drives *)	9.6 kbit/s - 12 Mbit/s
DeviceNet (+K451)	-	AC/DC drive ABB Drives *)	125 kbit/s - 500 kbit/s
ControlNet (+K462)	-	AC/DC drive ABB Drives *)	5 Mbit/s
Modbus (+K458)	RTU	ABB Drives *)	600 bit/s - 19.2 kbit/s
Ethernet (+K466)	Ethernet/ IP Modbus/ TCP	ABB Drives *)	10 Mbit/s / 100 Mbit/s
ProfiNet (+K467)	Profinet IO Modbus/ TCP	PROFdrive ABB Drives *)	10 Mbits / 100 Mbits
CANopen (+K457)	-	Drives and motion control ABB Drives*)	10 kbit/s - 1 Mbit/s

\*) Vendor specific profile



# Additional options

## Remote monitoring and diagnostics tool

### Browser-based, user-friendly

The intelligent ethernet NETA-01 module gives simple access to the drive via the internet, communicating via a standard web browser. The user can set up a virtual monitoring room wherever there is a PC with an internet connection or via a simple dial-up modem connection. This enables remote monitoring, configuration, diagnostics and, when needed, control. The drive can also provide process related information, such as load level, run time, energy consumption and I/O data, the bearing temperature of the driven machine, for instance.

This opens up new possibilities for the monitoring and maintenance of unmanned applications across a range of industries, for instance water, wind power, building services and oil & gas, as well as any application where the user needs access to the drives from more than one location. The NETA-01 also provides an opportunity for OEMs and system integrators to support their installed base globally.

### No PC needed at local end

The intelligent ethernet module has an embedded server with the necessary software for the user interface, communication and data storage. This gives ease of access, realtime information and the possibility for two-way communication with the drive, enabling immediate response and actions, saving time and money. This is possible without using a PC at the local end, as required by other remote solutions.

### Powerful and versatile

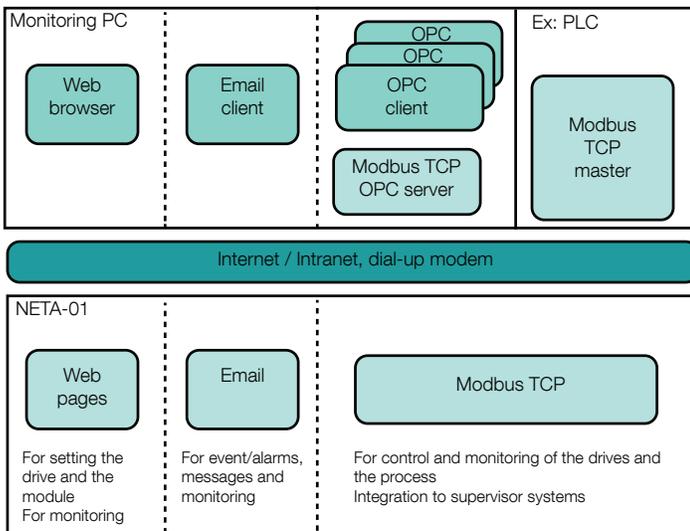
Up to nine drives can be connected to the intelligent ethernet module via fiber optic links. It is available as an option for new drives, as well as an upgrade for existing systems. Access to the module is secured by user ID and passwords.

The intelligent ethernet NETA-01 module connects to the drive with fiber optic cables. The size of the module is 3.7(h) x 1.4 (w) x 3.0 (d) in

The web page of the module is opened like any other web address. The home page shows a general overview of the system with traffic lights and action buttons to guide the user through the different sections.

### Features

- Virtual monitoring room for
  - Monitoring
  - Configuration of parameters
  - Diagnostics
  - Control, if needed
- Browser-based access via
  - Intra-/extra-/internet or
- Email Client
  - Event notification
  - Drive status update
- No PC needed at the local end
- Can be used as a Modbus/TCP bridge for process control
- The NETA-01 module may be used in conjunction with other Fieldbus modules from the previous page



# Pump control application software

## Pump control

Intelligent pump control software is a combination of traditional PFC which is specially designed for multi-motor pumping (or compressor, etc.) stations. While directly controlling one motor, the drive is able to start additional, direct-on-line motors whenever a higher capacity is needed.

## Multipump function

Additional features such as the multipump function are designed for pumping stations that consist of multiple pumps, each controlled by a separate drive. The drives can be connected so that in the case of pump failure or maintenance action on one drive, the remaining drives continue operation - having 100% redundancy. There is an autochange function to alternate between the pumps so all pumps have equal operating time and wear.

## Level control function

The liquid level of a container can be used as a process variable for a pumping station either filling or emptying the container when the level control function is activated. Three drives can be used in a master/follower configuration.

## Flow calculation

The flow calculation contains a function that enables reasonably accurate calculation of flow without the installation of a separate flow meter.

## Anti-jam function

The anti-jam function can be used for preventing solids from building up on pump impellers. The anti-jam procedure consists of a programmable sequence of forward and reverse runs of the pump, effectively shaking off any residue on the impeller.

## Adaptive programming

In addition to parameters, industrial drives have the possibility for function block programming as standard. Adaptive programming with 15 programmable function blocks makes it possible to replace relays or even a PLC in some applications. Adaptive programming can be done either by standard control panel or DriveAP, a user-friendly PC tool.

## The standard application macros

The ACQ800 features built in, pre-programmed application macros for configuration of such parameters as inputs, outputs and signal processing.

- MULTIMASTER
- PFC TRADITIONAL
- HAND/AUTO
- LEVEL CONTROL
- USER MACRO 1&2

## Software features

A complete set of standard software features offers premium functionality and flexibility.

- Accurate speed control
- Accurate torque control without speed feedback
- Adaptive programming
- Automatic reset
- Automatic start
- Constant speeds
- Controlled torque at zero speed
- DC hold
- DC magnetizing
- Diagnostics
- Flux braking
- Flux optimization
- IR compensation
- Master/follower control
- Mechanical brake control
- Motor identification
- Parameter lock
- Power loss ride-through
- Process PID control
- Programmable I/O
- Pump alternation
- Scalar control
- Speed controller tuning
- Start-up assistant
- User-selectable acceleration and deceleration ramps
- User adjustable load supervision/limitation

## Pre-programmed protection functions

A wide range of features provides protection for the drive, motor and the process.

- Ambient temperature
- DC overvoltage
- DC undervoltage
- Drive temperature
- Input phase loss
- Overcurrent
- Power limits
- Short circuit

## Programmable protection functions

- Adjustable power limits
- Control signal supervision
- Critical frequencies lock-out
- Current and torque limits
- Earth fault protection
- External fault
- Motor phase loss
- Motor stall protection
- Motor thermal protection
- Motor underload protection
- Panel loss

## Quality dimensioning

DriveSize is a PC program for helping the user to select the optimal motor, frequency converter and transformer, especially in those cases where a straightforward selection from a catalog is not possible. Additionally it can be used to compute currents, network harmonics and to create documents about the dimensioning based on actual load. DriveSize contains the current versions of the ABB motor and frequency converter catalogs.

The default values make DriveSize simple to use, but the user is provided with ample options for drive selection. The shortcut keys make drive selection easy while giving the optimal dimensioning result. A manual selection mode is also supported.

DriveSize is currently used by more than 1,000 engineers globally.

## DriveSize is for drive system components

- 3-phase standard, customized, and user defined motors
- ABB low voltage AC drives
- Transformers

## DriveSize features

- Selects the optimal motor, drive unit, supply unit and transformer
- Calculates network harmonics for a single supply unit or for the whole system
- Allows importation of own motor database
- Supplies dimensioning results in graphical and numerical format
- Prints and saves the results

The DriveSize PC program can be downloaded from [www.abb.com/drives](http://www.abb.com/drives).

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## DriveSize

**DriveSize is a PC program to help select an optimal motor, frequency converter and transformer particularly in cases where a straightforward selection from a catalogue is not possible. DriveSize can also be used to compute network harmonics and to create documents about the dimensioning. It contains current versions of our motor and frequency converter catalogues.**

The DriveSize software can be used in Win98, WinNT, Win2000 and WinXP operating systems. For installation instruction check the README.pdf. DriveSize has eight parts covering ACS 800 multidrives, ACS800 single drives, ACS600 multidrives, ACS600 single drives, ACS550, ACH550, ACS400 Drives 3ph and Direct on line motors.

Link to [DriveSize 2.2 Software](#).  
*You have to register, before you can download the software.*

Any feedback concerning DriveSize is welcome at [Drive Care - Support](#) ([drive.care@fi.abb.com](mailto:drive.care@fi.abb.com)) e-mail address.

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## Programming tool

DriveAP is a PC software tool for creating, documenting, editing and downloading adaptive programs and multiblock programming programs. DriveAP 1.1 supports adaptive programming, whereas DriveAP 2 supports both adaptive programming and multiblock programming applications. The adaptive programming contains 15 function blocks and is available in a standard application. The multiblock programming application contains over 200 function blocks, and also includes PROFIBUS fieldbus and drive I/O blocks. DriveAP offers a clear and easy way to develop, test and document these programs with a PC.

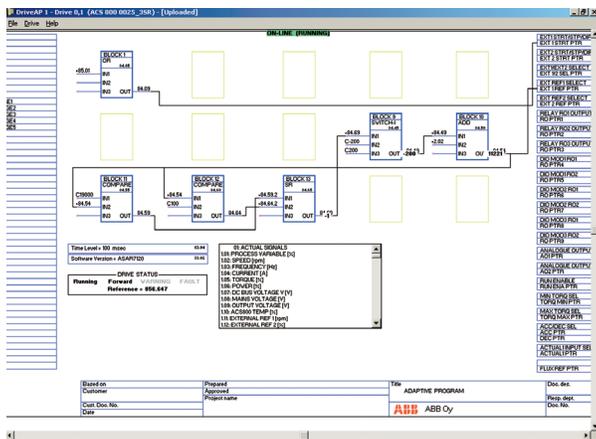
It is a user-friendly tool for modifying function blocks and their connections. No special programming skills are required, a basic knowledge about block programming is enough. DriveAP supports IEC61131.

The adaptive programs are easy to document as hard copies or store as PC files. The multiblock programming with all related information is saved directly to the drive.

## Upload or download

Both program types can be uploaded from connected drives and displayed graphically on a PC screen for service or documentation purposes.

The adaptive programs and multiblock programming programs made off-line can be downloaded to any of the connected drives that support corresponding programs.



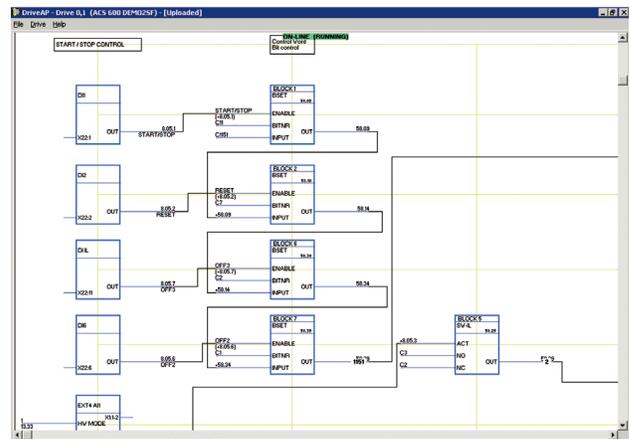
DriveAP with adaptive program of standard application.

## Three operating modes

- Stand-alone mode - DriveAP is not connected to a drive.
- The adaptive programming and multiblock programming can be carried out in the office, for example, and later downloaded to a drive.
- Off-line mode - DriveAP is connected to a drive. The adaptive programming and multiblock programming can be carried out in batch mode.
- On-line mode - DriveAP is connected to a drive. Changes to the adaptive programs and multiblock programs are written immediately to the drive and actual values are shown on the screen in real-time.

## DriveAP features

- Easy-to-use tool, no special skills required
- Create and download new programs
- Document programs
- Upload existing programs from the drive
- Operating modes
  - Stand-alone
  - Off-Line
  - On-Line



DriveAP with multiblock programming application.

# DriveWindow 2

## Start-up and maintenance tool

ABB's DriveWindow is an advanced, easy-to-use PC software tool for the start-up and maintenance of ABB industrial AC drives. Its host of features and clear, graphical presentation of the operation make it a valuable addition to your system, providing information necessary for troubleshooting, maintenance and service, as well as training.

With DriveWindow the user is able to follow the operation of several drives simultaneously by collecting the actual values from the drives on a single screen or printout.

Additionally, the client part of DriveWindow may reside on one intranet PC, and the server on another PC closer to the drives. This enables easy plant-wide monitoring with two PCs.

## High speed communication

DriveWindow uses a high-speed fibre optic cable network with DDCS communication protocol. This enables very fast communication between PC and drives. The fibre optic network is safe and highly immune to external disturbance. A fiber optic communication card inside the computer is needed.

## Monitoring drives

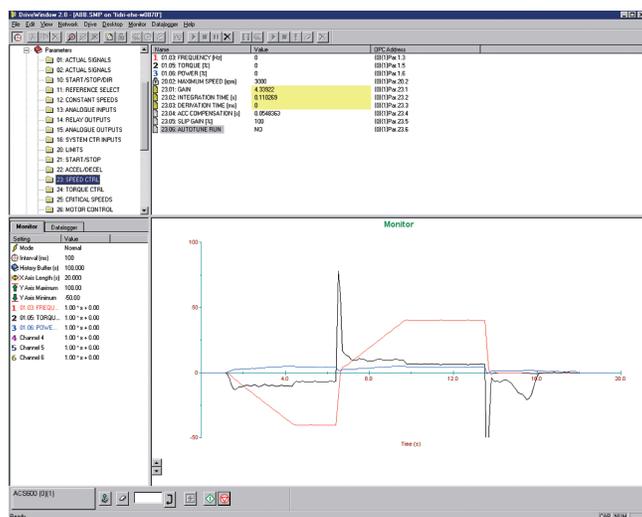
With DriveWindow you can monitor several drives simultaneously. The history buffer makes it possible to record a large amount of data in the PC's memory. The drive's data logger can be accessed with DriveWindow and viewed in graphical form. The fault logger inside the drive automatically documents every fault, warning and event which occurs. The fault history stored in the drive can be uploaded to your computer.

## Versatile back-up functions

Drive parameters can be saved to the PC with DriveWindow, and can easily be downloaded back to the drive whenever needed. The same goes for the software. DriveWindow allows the entire control board software to be saved and restored later, if needed. This makes it possible to use one control board as a spare part for many different sizes of drives.

## DriveWindow 2 features

- Easy-to-use tool for commissioning and maintenance
- Several drives connected and monitored at the same time
- Monitor, edit or save signals and parameters, clear graphical presentation
- High speed communication between PC and drive
- Versatile back-up functions
- View data collected and stored in the drive
- Fault diagnostics; DriveWindow indicates the status of drives, and also reads fault history data from the drive



# DriveWindow Light 2

## Start-up and maintenance tool

DriveWindow Light 2 is an easy-to-use start-up and maintenance tool for ACQ800 drives. It supports the following software: standard application, pump control, and spinning and traverse control. The DriveWindow Light 2 only supports drive frame sizes of R2-R8. DriveWindow Light uses the drive's panel connector for communication, which makes communication setup very easy.

## Light software with heavy features

DriveWindow Light offers many functions in an easy-to-use package. It can be used in an offline mode, which enables parameter setting at the office even before going to the actual site. The parameter browser enables viewing, editing and saving of parameters. The parameter comparison feature makes it possible to compare parameter values between the drive and the file. With the parameter subset you can create your own parameter sets. Controlling of the drive is naturally one of the features in DriveWindow Light.

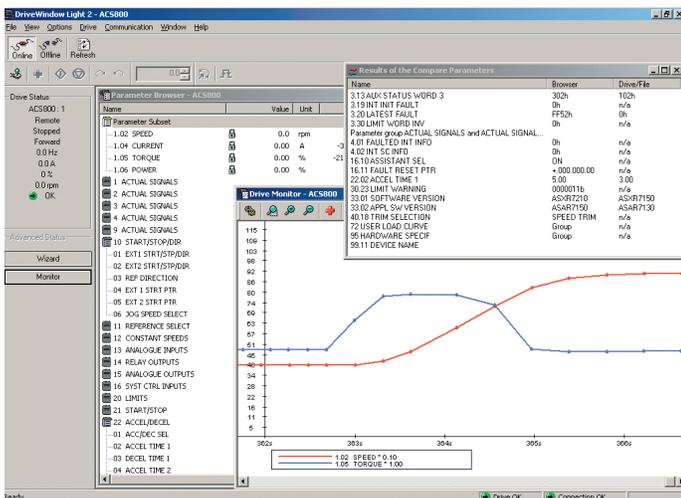
With DriveWindow Light, you can monitor up to four signals simultaneously. This can be done in both graphical and numerical format. Any signal can be set to stop the monitoring from a predefined level.

## Highlights

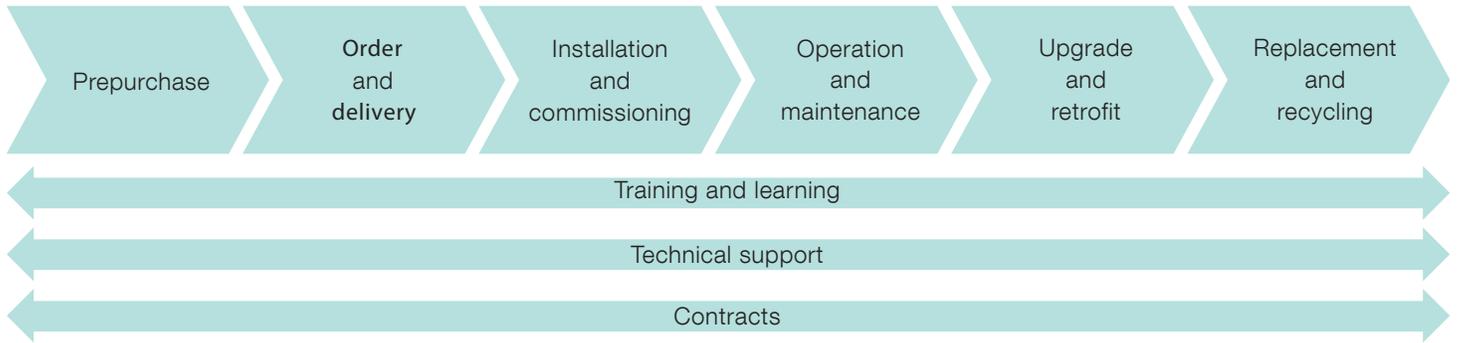
- Viewing and setting parameters in offline mode
- Editing, saving and downloading parameters
- Comparing parameters
- Graphical and numerical signal monitoring
- Drive control

## DriveWindow Light requirements

- Windows 98/NT/2000/XP
- Free serial port from a PC
- Free control panel connector
- NPCU-01 PC connection unit (serial communications)



# Expertise at every stage of the value chain



The services offered for ABB low voltage drives span the entire value chain, from the moment a customer makes the first enquiry through to disposal and recycling of the drive. Throughout the value chain, ABB provides training and learning, technical support and contracts. All of this is supported by one of the most extensive global drive sales and service networks.

## Pre-purchase

ABB provides a range of services that help guide the customers to the right products for their applications. Examples of services include correct drive selection and dimensioning, energy appraisal, harmonic survey and EMC assessment.

## Order and delivery

Orders can be placed through any ABB office or through ABB's channel partners. Orders can be placed and tracked online. ABB's sales and services network offers timely deliveries including express delivery.

## Installation and commissioning

While many customers have the resources to undertake installation and commissioning on their own, ABB and its third party channel companies are available to advise or undertake the entire drive installation and commissioning.

## Operation and maintenance

Through remote monitoring, ABB can guide the customer through a fast and efficient fault-finding procedure as well as analyze the operation of the drive and the customer's process. From maintenance assessment to preventive maintenance and reconditioning of drives, ABB has all the options covered to keep its customers' processes operational.

Should corrective maintenance of drives be needed, ABB offers on-site and workshop repair, fully backed up by the most extensive spare holding.

## Upgrade and retrofit

An existing ABB drive can often be upgraded to the latest software or hardware to improve the performance of the application.

Existing processes can be economically modernized by retrofitting the latest drive technology to mechanical control equipment, such as inlet guide vanes or dampers or older generations of drives.

Instead of replacing an entire drive or drive system, it is often more economical to modernize the old installation by reusing all relevant parts of the original equipment and purchasing new where necessary.

## Replacement and recycling

ABB can advise on the best replacement drive while ensuring that the existing drive is disposed in a way that meets all local environmental regulations.

## Entire value chain services

The main services available throughout the value chain include:

- Training and learning – ABB offers product and application training in classrooms and on the Internet.
- Technical support – At each stage of the value chain, an ABB expert is available to offer advice to keep the customer's process or plant operational.
- Contracts – Drive care contracts and other types of agreements, from individual services through to complete drive care covering all repairs and even drive replacements, are available.

# Secure uptime throughout the drive life cycle

ABB follows a four-phase model for managing the life cycles of its drives. The life cycle phases are active, classic, limited and obsolete. Within each phase, every drive series has a defined set of services.

Examples of individual services are drive selection and dimensioning, installation and commissioning, preventive and corrective maintenance, remote monitoring and intelligent diagnostics, technical support, upgrade and retrofit, replacement and recycling plus training and learning.

In the active phase the drive is in serial production. The drive, with complete life cycle services, is available for purchase. In the classic phase, the serial production of the drive has ended. The drive, with complete life cycle services, is available for plant extensions.

In the limited phase, the drive is no longer available. The life cycle services are limited. Spare parts as well as maintenance and repair services are available as long as materials can be obtained.

In the obsolete phase, the drive is not available. ABB cannot guarantee availability of services for technical reasons or within reasonable cost.

To ensure the availability of complete life cycle services, ABB recommends that a drive is kept in the active or classic phase by upgrading, retrofitting or replacing.

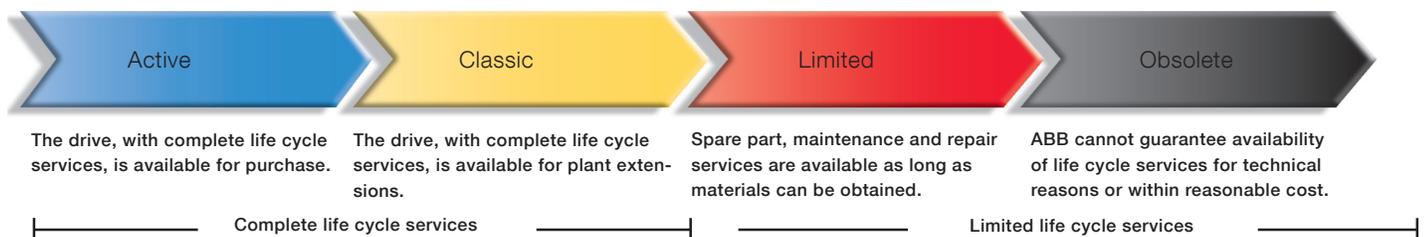
In the classic phase ABB carries out an annual review for each drive life cycle plan. Should any changes to the availability or duration of the services be necessary, ABB gives a life cycle announcement indicating eventual change of life cycle phase and/or any change in the duration of services.

In the limited phase, ABB issues a life cycle phase change announcement, half a year prior to shifting the product into the obsolete phase.

## Maximizing return on investment

The four-phase life cycle management model provides customers with a transparent method for managing their investment in drives. In each phase, customers clearly see what life cycle services are available, and more importantly, what services are not available. Decisions on upgrading, retrofitting or replacing drives can be made with confidence.

## ABB drive life cycle management model



To ensure the availability of complete life cycle services, a drive must be in the active or classic phase. A drive can be kept in the active or classic phase by upgrading, retrofitting or replacing.

**Caution!** A drive entering the limited or obsolete phase has limited repair options. This may result in unpredictable process downtime. To avoid this possibility, the drive should be kept in the active or classic phase.







# Contact us

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

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

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ACC800-PHTC01U-EN REVA Effective: 07/01/2016