Low voltage AC drives

ABB drives for water and wastewater
ACQ810
0.37 to 500 kW

Power and productivity
for a better world™

ABB

The intelligent drive choice for water and wastewater applications
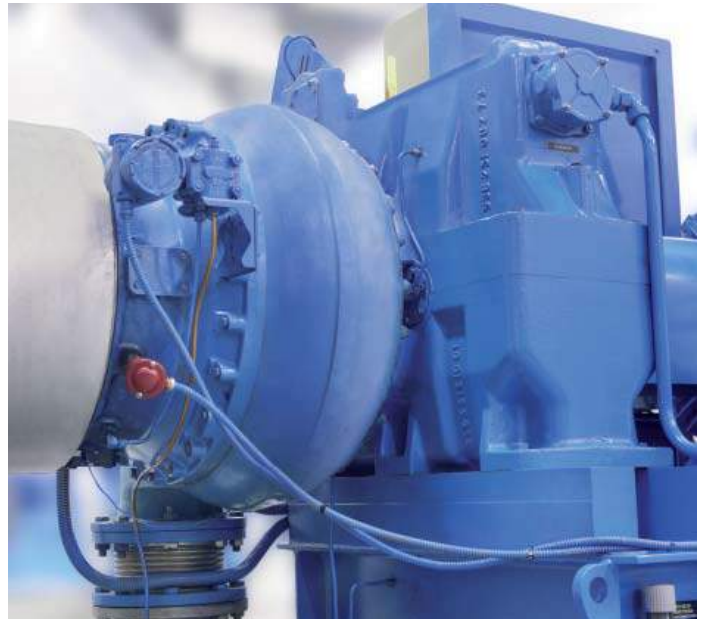
The ACQ810 drive for water and wastewater applications features tailor made functions for single and multi-pump system control. These pump specific functions help reduce total life cycle operating and maintenance costs across the pumping system. The drives achieve this by:

– Reducing startup stress on the pump system
– Calculating the required motor speed based current process conditions
– Optimizing energy consumption in parallel pumping systems
– Sharing operating times across pumps
– Monitoring, preventing and scheduling automated pump cleaning runs
– Preventing cavitation and pump dry run
– Providing redundancy in parallel pump systems
– Monitoring energy consumption
– Monitoring and protecting the pump's motor
– Displaying energy saving information in kWh, currency or CO_2 emissions

Optimal pump control for various applications
– Raw water pumps, booster pumps, wastewater pumps
– Rain water pumps, irrigation pumps, slurry pumps
– Submersible pumps, dry-installed pumps

Intelligent solution for controlling pump performance
– Tailor-made pump control functions for single and multi-pump applications
– Clear, easy-to-understand documentation and software
– Compliance with mandatory EN 61000-3-12 standard on harmonic currents
– Advanced energy saving functions

Easy and cost-effective cabinet assembly
– Fast and easy installation
– Narrow, compact design
– Side-by-side installation saves space
– Modular structure provides flexibility in system design and configuration

Rapid and simple pumping system startup
– Intelligent startup assistant ensures simple pumping system commissioning
– Easy-to-use documentation based on real pumping applications
– Preprogrammed and preconfigured macros for typical pump applications

Advanced energy efficiency in pumping systems

– Energy savings up to 50 percent in speed controlled pump applications – save energy and reduce carbon dioxide emissions
– Advanced functions such as energy optimizer to improve energy efficiency
– Optimized energy consumption in parallel pumping systems
– Easy energy efficiency management - built-in calculator monitors used and saved energy and displays them in kWh, currency ($ or €) or volume of CO_2 emission

Maximized process uptime

– Maintenance assistant handles preventive maintenance for drive and pump, reminding users about planned maintenance based on running hours
– Diagnostic assistant helps to locate problems or reasons for performance changes in pumping system and suggests remedies
– Redundancy in parallel pumping systems keeps process running even if one pump fails
– Prevention of dry running and cavitation
– Coated boards for longer drive lifetime

Life cycle support

– Extensive support documentation and material
– Advanced PC tools available for dimensioning, programming, commissioning and maintenance
– Worldwide service network operated by ABB and its partners

What is an AC drive?

An AC drive is an electronic device that is used to adjust the rotating speed and torque of a standard, electric AC motor. The electric motor, in turn, drives a load such as a pump. An AC drive changes the frequency of the alternating current and voltage. A drive consists of three parts. A rectifier converts the input line power, which has a nominally fixed voltage and frequency, to fixed voltage DC power. This fixed voltage DC power is fed into the DC bus circuit, which filters the pulsating voltage. The inverter unit then changes the fixed voltage DC power to AC output power with adjustable voltage and frequency.
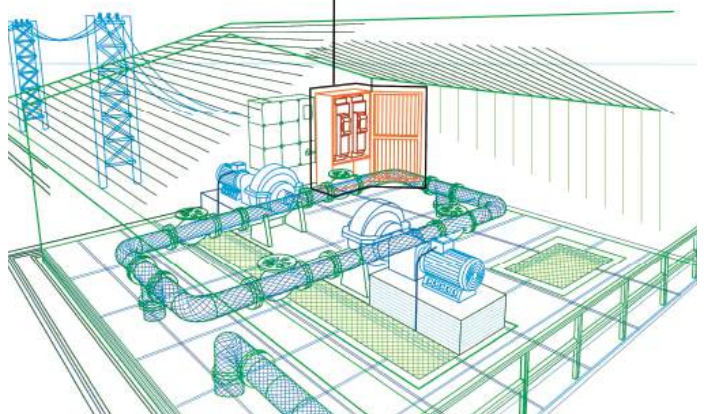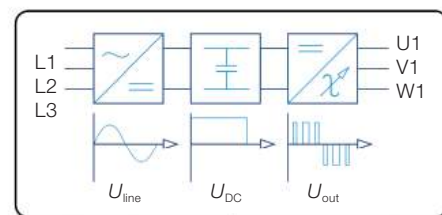
Built-in pump functions improve your efficiency

ACQ810 drives incorporate all the functions most commonly required by pump users. Pump specific features ensure accurate control of water flow throughout the processing cycle, from raw water, to utilization, to wastewater treatment.

Built-in pump specific features are easy to configure. Preconfigured macros for single and multi-pump applications walk you through drive setup. In addition, the built-in pump features can be easily customized to meet unique pump system configurations.
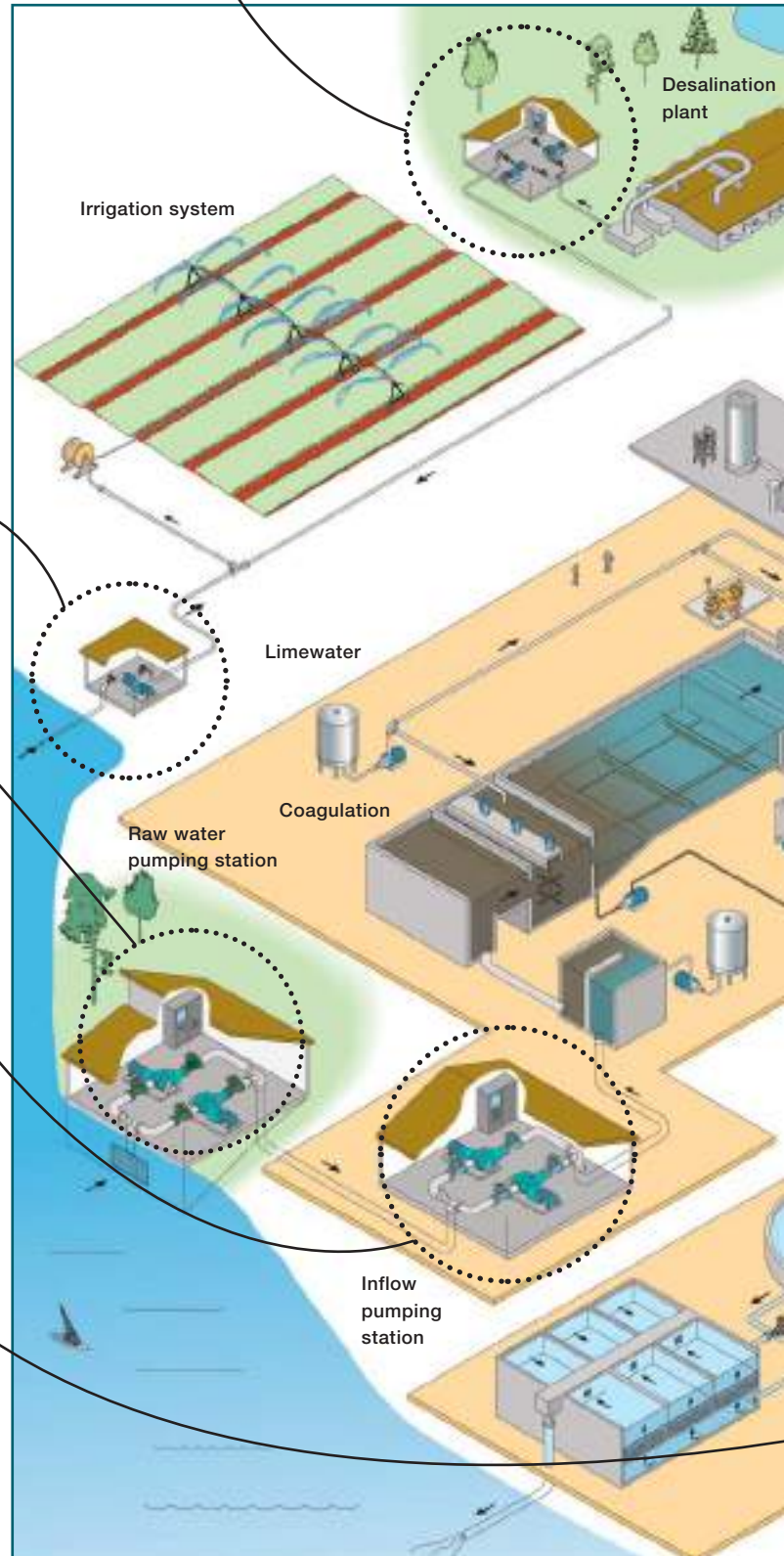
Flow calculation provides the drive with a flow meter routine that very accurately determines the flow rate within a process. This function avoids the need for costly external flow meters and is suitable for applications where the flow data is not needed for invoicing purposes.

Soft pipe filling provides a pump with soft-start enabling a smooth build-up of flow in pipes. This avoids pressure peaks, for example in irrigation systems, where pipes are momentarily empty and controlled pipe filling is demanded. The life time of the pipe work and pumping system is increased.

Pump auto change balances the operating time of all the pumps in the parallel pumping system over the long term. The lifetime of the pumps and motors are increased. This helps to increase the mean time between repairs and reduce service costs.

Redundancy ensures reliable operation in multi-pump systems with several parallel pumps. The function provides system redundancy, so should one or more pumps fail or require maintenance, the remaining pumps continue operating. Overall maintenance time and cost are decreased.

Pump specific protections help to maintain disturbance-free operating time in a process. The protection functions indicate if the pre-defined process conditions change. If the flow or pressure exceeds defined process limits, the appropriate alarm is generated. For example, using this function can help prevent a pump dry run.

Desalination plant

Irrigation system

Limewater

Coagulation

Raw water pumping station

Inflow pumping station

Remote monitoring and diagnostics for pumping stations can be easily implemented with ABB's SREA-01 Ethernet adapter. This optional remote interface module can send process data, logs and event messages independently, without additional on-site devices. The adapter's web server functionality brings remote monitoring interface to standard Internet browser. Routine site visits can be reduced helping to save costs.

Multi-pump control is for applications where several parallel pumps are operated together and the required flow rate is variable. It maintains stable process conditions optimizing the speed and number of the pumps needed. This function provides the most energy efficient way to operate parallel pumps.

Pumping station

Pressure boosting station

Membrane treatment

Clean water basin

Wastewater pumping station

UV light treatment

Screening

Active carbon filtration

Ozone treatment

Pre-aeration

Contact basin

Sand filtration

Clarification

Preliminary sedimentation

Aeration

Final sedimentation

Gas storage tank

Biological after-filtration

Humus

Sludge drying

Gas-fired power plant

Catalyst

Sludge digestion

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Pump priority is intended for systems where the consumption rate varies based on demand. For example, the drive can be programmed to operate higher capacity pumps during daytime and smaller units at night. This allows for better maintenance planning and can boost energy efficiency by operating pumps closer to their best efficiency point.

Sleep & boost is suitable for clean water pumping system, during night when water consumption falls. The drive's sleep & boost function detects pressure drops in the pipes and runs the pump to boost pressure prior to shutdown. Pumping restart when the pressure falls below the minimum level. This function extends the pump's sleep time and helps save energy. Also the lifetime of the pump and motor increase when non-productive running time is avoided.

Level control is used to control the filling or emptying of wastewater storage tanks. Fast-ramp starting creates a flush effect to keep pipes clear. In addition, users can define the "efficiency speed" based on the pumps best efficiency point. This helps to minimize overall energy consumption. Level control can be used within a station controlling up to eight pumps.

Pump cleaning or anti-jam is used in wastewater pumping stations to prevent pump and pipe clogging. A sequence of forward and reverse runs of the pump clean the impeller. If the pump cleaning function runs too often, an alarm is raised. The function can be timed to occur without interrupting the pumping duty cycle helping to maximize process uptime.

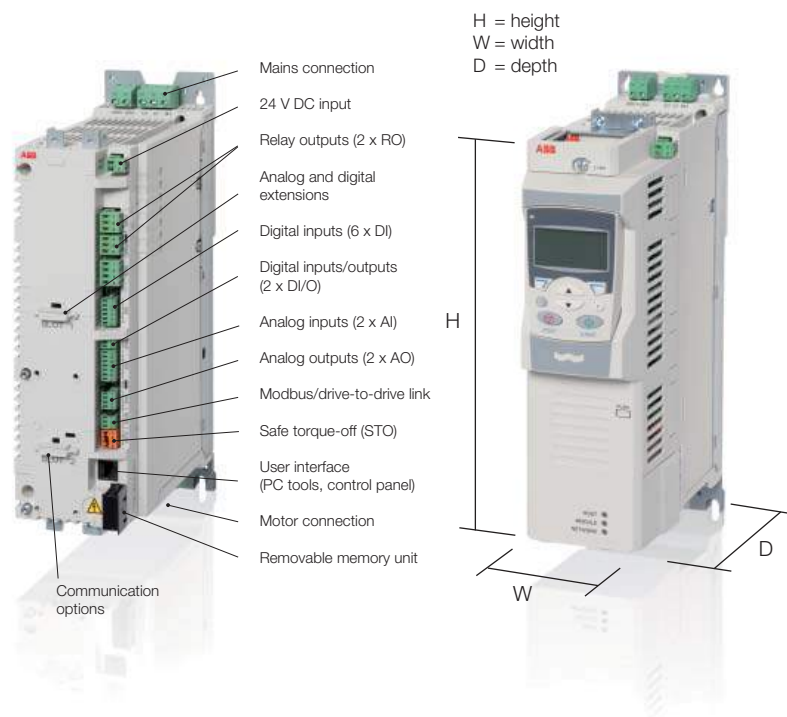## Smaller carbon footprint through improved energy efficiency

One of the biggest benefits of using ABB drives for water and wastewater applications is the energy saving opportunity over fixed speed or conventional flow control methods. Rather than have an electric motor running continuously at full speed, an AC drive allows the user to variably control the motor speed, depending on the demand.

ABB offers energy appraisals and energy saving tools for easily assessing energy savings in water and wastewater applications. Energy appraisals rapidly determine where and how much energy can be saved. Power savings of up to 50 percent can be reached by reducing the motor speed by just 20 percent. In addition, ABB drives offer a return on investment usually within two years based on energy saving alone.

A clean standard against polluted networks
IEC/EN 61000-3-12

The ABB drives for water and wastewater applications fulfill IEC/EN 61000-3-12 and carry manufacturer's written statement of compliance. This means security and simplicity for specifying engineers and facility managers.

Inputs, outputs and dimensions

H = height
W = width
D = depth

Mains connection
24 V DC input
Relay outputs (2 x RO)
Analog and digital extensions
Digital inputs (6 x DI)
Digital inputs/outputs (2 x DI/O)
Analog inputs (2 x AI)
Analog outputs (2 x AO)
Modbus/drive-to-drive link
Safe torque-off (STO)
User interface (PC tools, control panel)
Motor connection
Removable memory unit
Communication options

Dimensions

Frame size	Dimensions and weights			
	Height [1]	Depth [2]	Width	Weight
	mm	mm	mm	kg
A	364 (518)	219	94	3.2
B	380 (542)	297	101	5.4
C	567	298	166	15.6
D	567	298	221	21.3
E0	602	376	276	34
E	700	465	312	67
G [3]	1564	571	562	200
G1* [3]	1462 (1560) [4]	505 (515) [4]	305 (329) [4]	161 (191) [4]
G2 [3]	1662 (1710) [4]	505 (515) [4]	305 (329) [4]	199 (229) [4]

Notes

All dimensions and weights are without additional options.
[1] Height is the maximum measure without clamping plates. In A and B frames the external C3 EMC-filter (height with filter in brackets). EMC-filter is internal in frames C, D, E0, E and G.
[2] Total depth with control panel
[3] G frames include separately mounted control section, 325 mm H x 114 mm D x 94 mm W, 1.3 kg (except for frame G1 and G2 with integrated control unit)
[4] With +H381 optional cabling panel

Technical data and types

Technical specification

Mains connection

Voltage and power range	3-phase, 380 to 480 V, +10/-15% (1.1 to 500 kW)
	3-phase, 200 to 240 V, +10/-10% (0.37 to 22 kW)
Frequency	50 to 60 Hz ± 5%

Motor connection

Motor types	Asynchronous AC induction motors
Voltage	3-phase, from 0 to U_N
Output frequency	0 to 500 Hz
Motor control	ABB's DTC (direct torque control)

Environmental limits

Degree of protection	IP20 according to EN 60529 (G frame IP00); Open type according to UL 508
Ambient temperature	-10 to +55 °C, derating above 40 °C, no frost allowed
Installation altitude	0 to 4000 m (IT network: 2000 m), derating above 1000 m: 1%/100 m
Relative humidity	Max. 95%, no condensation allowed
Contamination levels	According to IEC 60721-3-3: Chemical gases: Class 3C2, Solid particles: Class 3S2, No conductive dust allowed

Inputs and outputs

2 analog inputs	Selectable for current and voltage
Voltage signal	0 to 10 V
Current signal	0 to 20 mA
2 analog outputs	0 to 20 mA
2 bidirectional digital I/Os	24 V logic levels, maximum 200 mA total output current
6 digital inputs	24 V logic levels
2 relay outputs	Maximum switching voltage 250 V AC/30 V DC, maximum continuous current 2 A rms
Modbus/Drive to drive link	Selectable, RS-485 serial link
I/O extensions	Analog I/O extension, FIO-11
	Analog and digital I/O extension, FIO-21
	Relay extension, FIO-31
Communication options	DeviceNet™ adapter, FDNA-01
	PROFIBUS DP adapter, FPBA-01
	Ethernet (EtherNet/IP™, Modbus/TCP), FENA-11
	Modbus adapter, FSCA-01
	LonWorks® adapter, FLON-01
Remote monitoring	Ethernet adapter, SREA-01

Protection functions

	Over/undervoltage controller
	Motor short-circuit protection
	Input phase-loss detection (both motor and line)
	Overcurrent protection
	Drive temperature/overload controller
	Power limits
	Motor thermal protection

Product compliance

Conformity to standards	CE, cUL, UL, CSA, GOST-R, C-Tick
	Frames G1 and G2: CE; pending: UL, GOST-R, cUL, CSA, C-Tick
Harmonics	IEC/EN 61000-3-12
EMC (according to EN 61800-3)	Category C3 (C2 with optional filter)
Functional safety	Safe torque-off (STO according to EN 61800-5-2)
	IEC 61508: SIL 3
	EN 62061: SILCL 3
	EN ISO 13849-1: PL e

PC tools

DriveStudio	Startup and maintenance tool
DriveSPC	Programming tool

Types and ratings

P_N (kW)		I_{2N} (A)	I_{cont} (A)	I_{max} (A)	Type designation (order code)	Frame size
U_N=400 V	U_N=230 V					
1.1	0.37	2.7	3	4.4	ACQ810-04-02A7-4/2*	A
1.1	–	3	3.6	5.3	ACQ810-04-03A0-4	A
1.5	0.55	3.5	4.8	7.0	ACQ810-04-03A5-4/2*	A
2.2	0.75	4.9	6	8.8	ACQ810-04-04A9-4/2*	A
3	1.1	6.3	8	10.5	ACQ810-04-06A3-4/2*	A
4	1.5	8.3	10.5	13.5	ACQ810-04-08A3-4/2*	B
5.5	2.2	11	14	16.5	ACQ810-04-11A0-4/2*	B
7.5	3	14.4	18	21	ACQ810-04-14A4-4/2*	B
11	5.5	21	25	33	ACQ810-04-021A-4/2*	C
15	7.5	28	30	36	ACQ810-04-028A-4/2*	C
18.5	–	35	44	53	ACQ810-04-035A-4	C
22	11	40	50	66	ACQ810-04-040A-4/2*	C
30	15	53	61	78	ACQ810-04-053A-4/2*	D
37	18.5	67	78	100	ACQ810-04-067A-4/2*	D
45	22	80	94	124	ACQ810-04-080A-4/2*	D
55	–	98	103	138	ACQ810-04-098A-4	E0
75	–	138	144	170	ACQ810-04-138A-4	E0
90	–	162	202	282	ACQ810-04-162A-4	E
110	–	203	225	326	ACQ810-04-203A-4	E
132	–	240	260	326	ACQ810-04-240A-4	E
160	–	286	290	348	ACQ810-04-286A-4	E
160	–	302	340	480	ACQ810-04-302A-4	G
160	–	361	400	568	ACQ810-04-361A-4	G
200	–	414	430	588	ACQ810-04-414A-4	G
250	–	477	521	588	ACQ810-04-477A-4	G
315	–	550	602	840	ACQ810-04-550A-4	G
355	–	616	693	1017	ACQ810-04-616A-4	G
400	–	704	720	1017	ACQ810-04-704A-4	G
200	–	377	387	470	ACQ810-04-377A-4	G1
250	–	480	500	560	ACQ810-04-480A-4	G1
315	–	570	580	680	ACQ810-04-570A-4	G1
355	–	634	650	730	ACQ810-04-634A-4	G1
400	–	700	710	850	ACQ810-04-700A-4	G2
450	–	785	807	1020	ACQ810-04-785A-4	G2
500	–	857	875	1100	ACQ810-04-857A-4	G2

P_N = Typical motor power
I_{2N} = 110% overload allowed for 1 minute every 5 minutes through the entire speed range
I_{cont} = Continuous output current with no overload capacity
I_{max} = Maximum output current. Available for 10 s at start, otherwise as long as allowed by drive temperature.

* The last number in type code (4 or 2) refers nominal supply voltage U_N. Select number 4 when U_N is 400 V and number 2 when U_N is 230 V.

Note: The ratings apply at 40 °C ambient temperature

Contact us

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

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