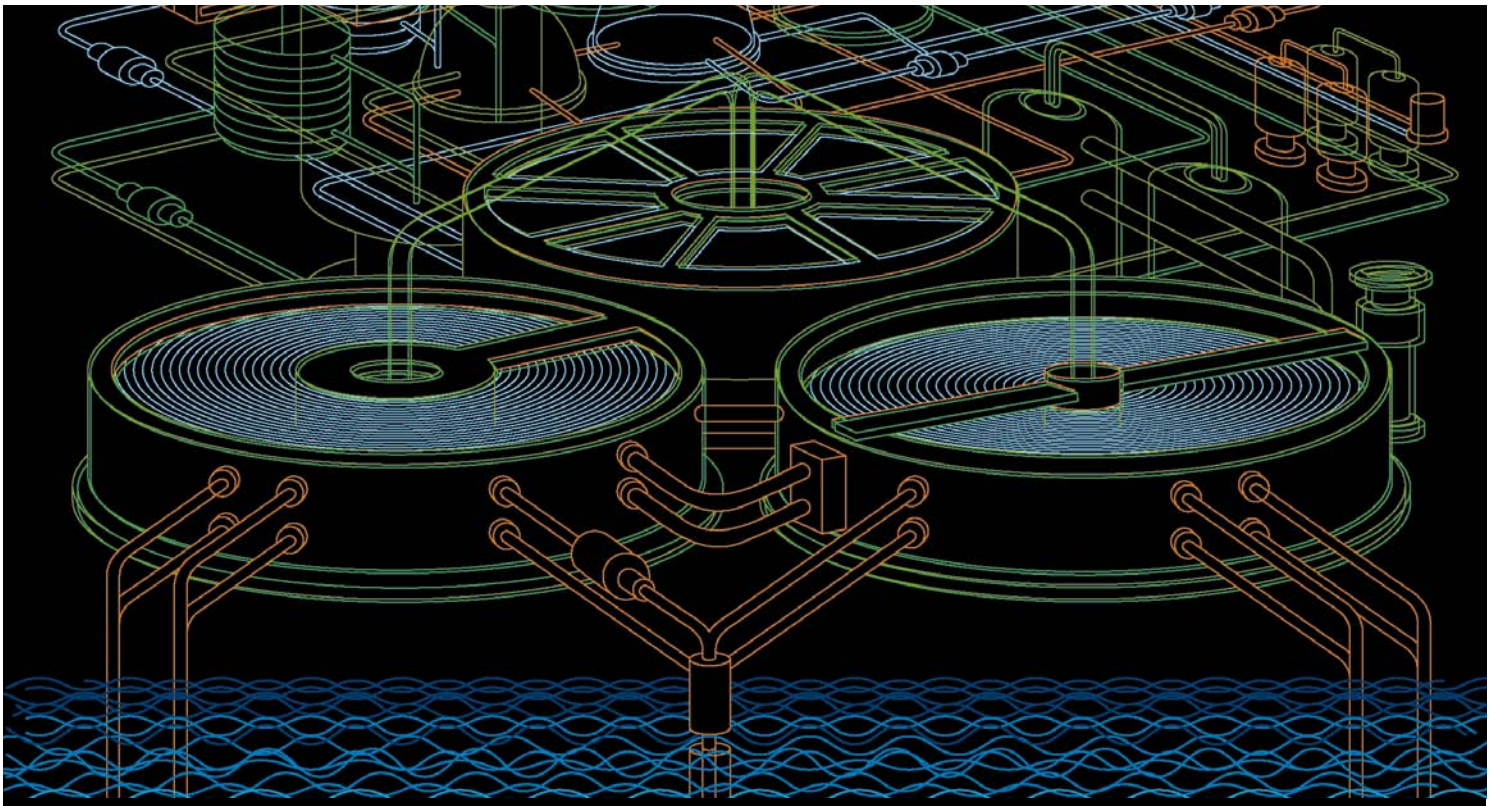


Low voltage AC drives

ABB industrial drives
ACQ810, drive modules for water and wastewater 0.37 to 400 kW

Power and productivity
for a better world™

The intelligent drive choice for water and wastewater applications

ABB industrial drive modules are the ideal choice for water and wastewater applications. Specially designed to meet the demanding needs of squared torque pump control, these highly advanced drives maximize uptime and minimize energy costs in pumping systems.

Specifically designed modules for water and wastewater applications feature tailor-made pump control functions for single and multi-pump systems. These functions ensure smooth, disturbance-free operation of water and wastewater processes, maximizing energy efficiency while reducing unnecessary downtime. The drives' pump-specific functions decrease the life cycle cost of the pumping system, helping to save time and money.

The modules are designed for cabinet assembly and are easily mounted side-by-side. Intelligent start-up assistant ensures that drive commissioning is straightforward, and the functions needed for most pumping systems can be easily implemented with the pre-programmed macros. Starting up a pumping system and optimizing its performance is extremely easy.

ABB industrial drive modules include everything needed for reliable and efficient pump control in water and wastewater applications.

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 start-up
- Intelligent start-up assistant ensures simple pumping system commissioning
- Easy-to-use documentation based on real pumping applications
- Pre-programmed and pre-configured macros for typical pump applications

ABB industrial drive modules - perfect partners for pumps!

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

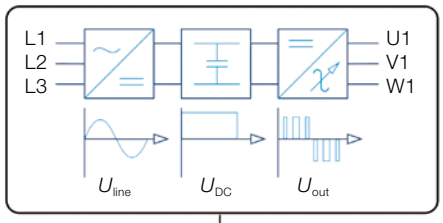
- Maintenance assistant handles preventive maintenance for drive and pump, reminding users about planned maintenance based on running hours
- Diagnostic assistant helps to locate problems or reasons for performance changes in pumping system and suggests remedies
- Redundancy in parallel pumping systems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

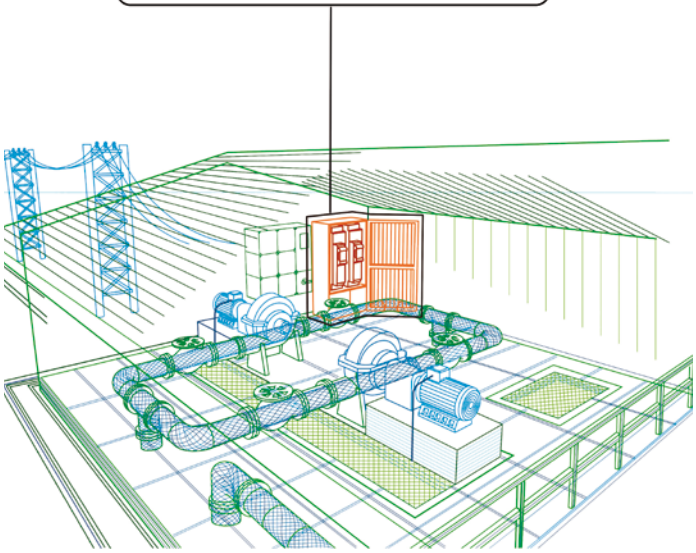
Life cycle support

- 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. Regular 50 Hz 3-phase current is fed in to the rectifier part, which 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 maximize process uptime

ABB industrial drive modules for water and wastewater applications incorporate all the functions most commonly required by pump users. The drives' pump specific features ensure accurate control of water flow throughout the processing cycle – from raw water, through utilization, to wastewater treatment.

The modules include pre-programmed pump control functions. These functions are easy to select and implement using pre-configured macros for single and multi-pump applications. In addition, an easy-to-use programming utility is provided, enabling users to further customize their drives.

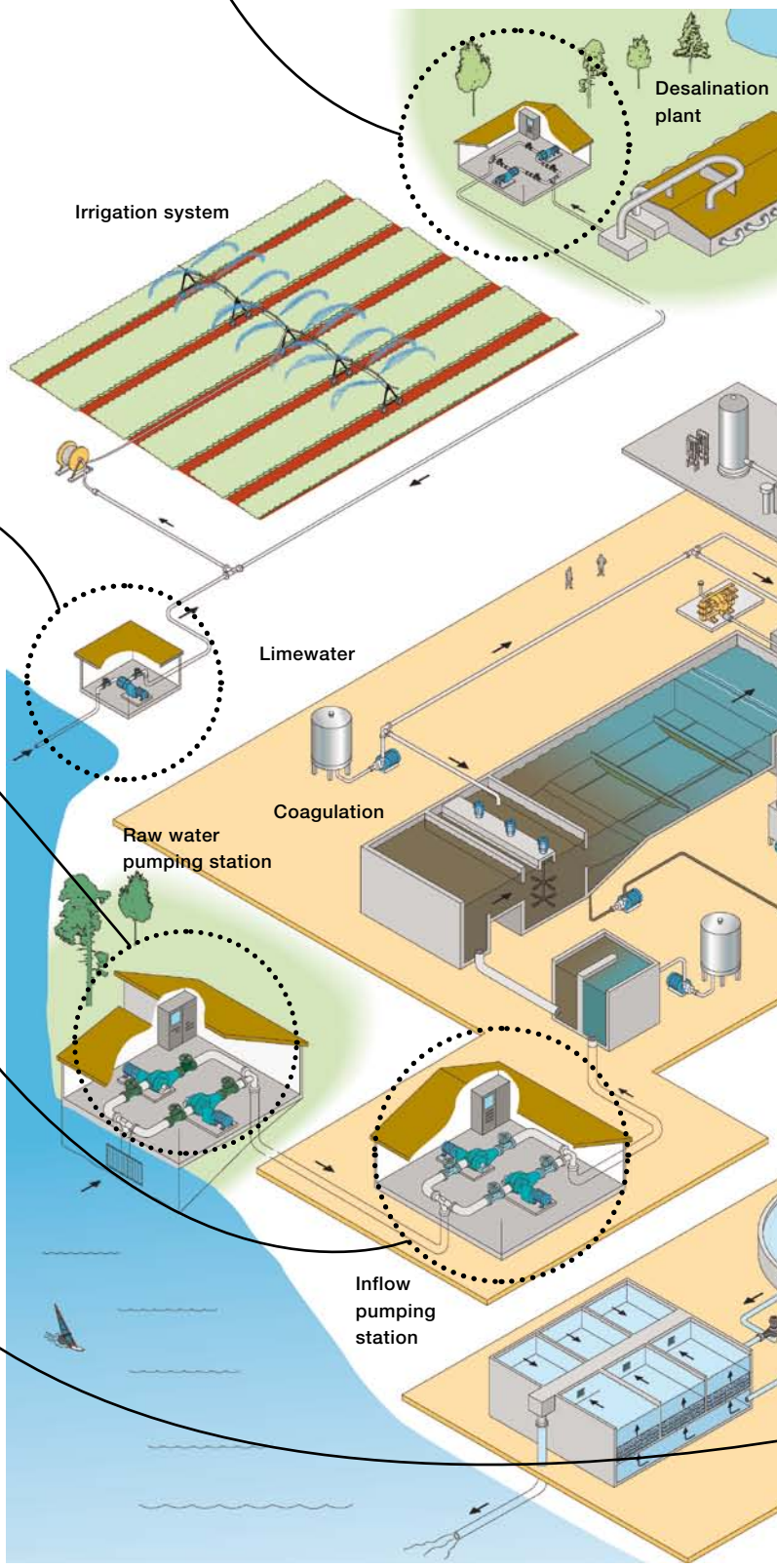
Flow calculation provides the drive with a flow meter routine that very accurately determines the flow rate within a process. This function avoids the need for costly external flow meters and is suitable for applications where the flow data is not needed for invoicing purposes.

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.

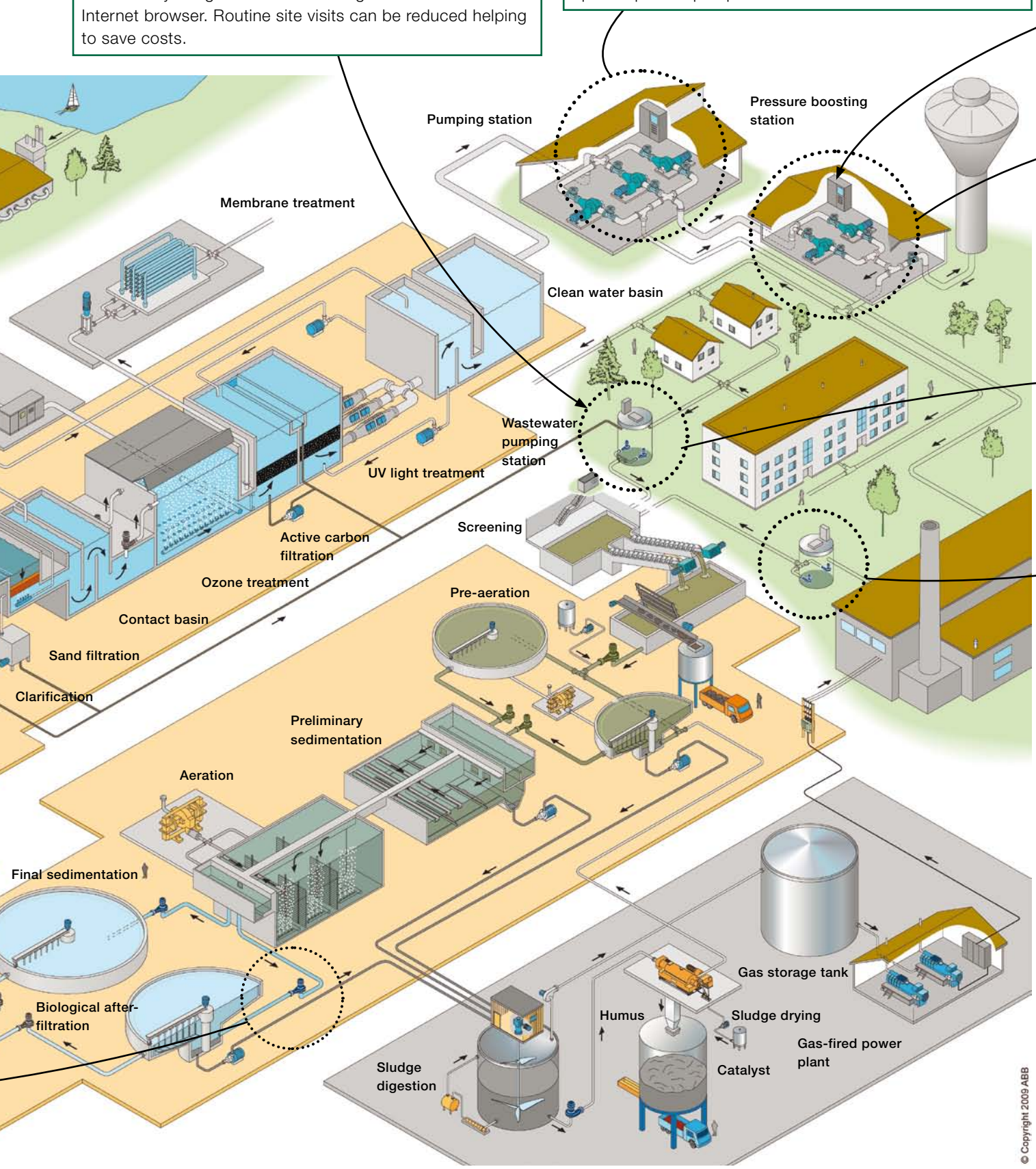
Redundancy ensures reliable operation in multi-pump systems with several parallel pumps. The function provides system redundancy, so should one or more pumps fail or require maintenance, the remaining pumps continue operating. Overall maintenance time and cost are decreased.

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.



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.



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 industrial drive modules 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 industrial drive modules offer a return on investment usually within two years based on energy saving alone.

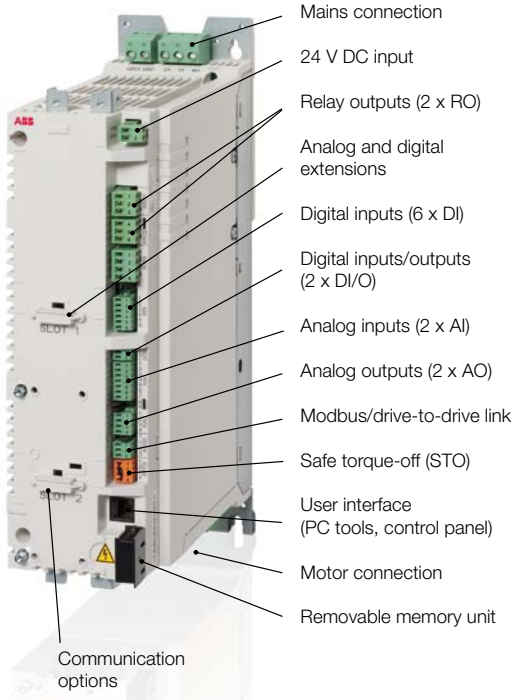
A clean standard against polluted networks - IEC/EN 61000-3-12

The ABB industrial drive modules 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.

The new European standard sets strict limits for harmonic currents produced by products connected to the electrical network.

Harmonic currents are forms of pollution on the electrical network. The harmonics can cause several undesired effects - flickering lights, failing computers, and overheating of electrical equipment.

Inputs and outputs



Technical data and types

Technical specification

Mains connection	
Voltage and power range	3-phase, 380 to 480 V, +10/-15% (1.1 to 400 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 (G frame +50 °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 Voltage signal Current signal	Selectable for current and voltage 0 to 10 V 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-01 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
Harmonics	IEC/EN 61000-3-12
EMC (according to EN 61800-3)	Category C3 (C2 with optional filter)
Functional safety	IEC 61508: SIL 3 EN 954-1: Category 4 IEC 62061: SILCL 3 EN ISO 13849-1: PL e Certified by TUV
PC tools	
DriveStudio	Start-up and maintenance tool
DriveSPC	Programming tool

Types and ratings

P_N (kW) U_N=400 V	P_N (kW) U_N=230 V	I_{2N} (A)	I_{cont} (A)	I_{max} (A)	Type designation (order code)	Frame size
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	E
160	–	361	400	568	ACQ810-04-361A-4	E
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

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

Dimensions

Frame size	Dimensions and weights			
	Height [1] mm	Depth [2] mm	Width mm	Weight 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	1564	571	562	200

Notes
All dimensions and weights are without 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

H = height
W = width
D = depth

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