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FOR SMOOTH MOTOR CONTROL AND ENERGY SAVINGS

# Low voltage AC drives and softstarters

## Product guide



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**AC drives and  
softstarters.  
For smooth  
motor control  
and energy  
savings.**

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# Smooth motor control and energy savings

## 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 fan, pump or conveyor.

AC drives are also referred to as frequency converters, variable frequency drives (VFD), variable speed drives (VSD), adjustable frequency drives (AFD), adjustable speed drives (ASD) or inverters.

## What is a softstarter?

Softstarter is a full-speed starter that accelerates, decelerates and protects three phase motors. The softstarter controls the voltage

applied to the motor by using thyristors which gives it control over current, torque and acceleration. The softstarter's parameters can be configured to match the application's requirements, so that the required current and torque are optimized.

## ABB - global market and technology leader in AC drives

ABB ([www.abb.com](http://www.abb.com)) is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. ABB is the world's largest drives manufacturer. The ABB Group of companies operates in around 100 countries and employs more than 140,000 people.

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Electric motors consume about 65% of all electricity used throughout industry. Yet, less than 10% of those motors are fitted with a variable speed drive or a softstarter.

Softstarters are ideal choice when an application requires speed and torque control only during startup. The softstarters prevent large inrush currents from being drawn while starting the motor by smoothly ramping up the supply voltage. The smooth ramp up prolongs the life

time of the motors because less current means also less heat in the motors. AC drives, on the other hand, are good choice when speed control only during a startup is not enough, big energy savings are a must, custom motor control is required, or more functionalities are needed.



## Improve your processes with softstarters and AC drives

- **Increased life time**  
Reduced starting current decreases the electrical stress on the motor and network. Smooth ramp up to full speed also reduces mechanical wear on the equipment prolonging its life time.
- **Increased productivity**  
Using softstarters and drives increases the productivity of the applications by reducing the number of unintended stops caused by excessive heating of the motor or sudden breakdowns of mechanical equipment due to high mechanical stress.
- **Reduced need for maintenance**  
Being able to apply a softer starting moment and vary the speed and torque of an electric motor means there is less wear and tear on the motor and the driven machine.

## Further optimize your processes with AC drives

- **Substantial energy savings**  
Rather than having an electric motor running continuously at full speed, an electric drive allows the user to slow down or speed up the motor depending on the demand.
- **Optimal process control**  
An electric drive enables the process to achieve the right speed and torque while maintaining its accuracy. This contributes to more consistent quality and throughput of the end product.
- **Efficient system upgrade**  
An AC drive allows the removal of some valves, gears and belts. It also ensures network dimensioning based on a lower starting current.

## ABB drives and softstarters common features

- **Easy to select**  
You can be sure to find a right product for your application from a wide selection of ABB softstarters and AC drives.
- **Easy to purchase**  
ABB softstarters and drives are available from ABB and selected ABB partners. Please contact ABB for more details.
- **Easy to install**  
The softstarters and drives are simple to install, featuring a variety of mounting options from wall-mounted to cabinet mounted.
- **Easy to operate**  
Once installed and commissioned, the softstarters and drives are incredibly easy to operate. The user interface allows instant adjustments to speed or other more advanced parameters.

### Choosing between a drive and a softstarter

Identify the application	
1	Is it a full speed application, or a variable speed application?
2	Is speed and torque control during start-ups enough, or does the speed and torque need to be controlled also during run cycles?
3	Is smooth start-up enough, or are energy savings sought?
→ <b>Choose a softstarter</b>	→ <b>Choose an AC drive</b>
Softstarters offer you a complete range of products for full speed applications. See the softstarter product pages, starting on page 20, to select the softstarter for your needs.	Variable speed drives offer you a right product for variable speed applications. See the drive selection tool on page 8 to select the drive to match your needs.

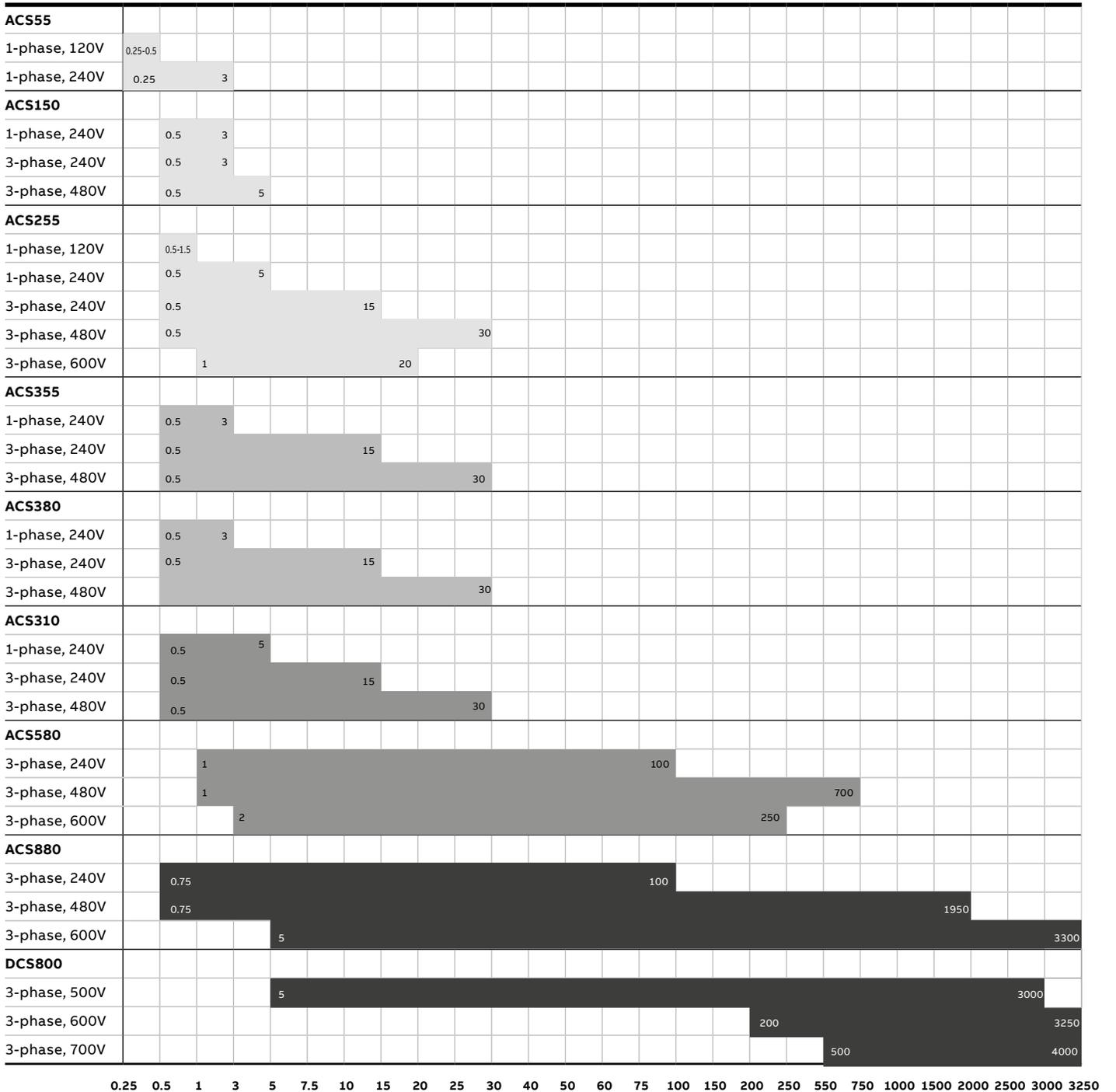
### Application examples:

Softstarters: pumps, compressors, fans, conveyors, bow thrusters, crushers etc.

Variable speed drives: conveyors, fans, mixers, grinders, elevators, cranes, compressors, etc.



# Horsepower comparison



# Drive selection table

Specification		ACS55	ACS150	ACS255	ACS355	ACS380
<b>Voltage and power ranges</b>		1-phase, 100 to 120V: 0.25 to 0.5 hp (0.18 to 0.37 kW)	1-phase, 200 to 240V: 0.5 to 3 hp (0.37 to 2.2 kW)	1-phase, 110 to 120V: 0.5 to 1.5 hp (0.37 to 1.1 kW)	1-phase, 200 to 240V: 0.5 to 3 hp (0.37 to 4 kW)	1-phase, 200 to 240V: 0.5 to 3 hp (0.37 to 2.2 kW)
		1-phase, 200 to 240V: 0.25 to 3 hp (0.18 to 2.2 kW)	3-phase, 200 to 240V: 0.5 to 3 hp (0.37 to 2.2 kW)	1-phase, 200 to 240V: 0.5 to 5 hp (0.37 to 4 kW)	3-phase, 200 to 240V: 0.5 to 15 hp (0.37 to 11 kW)	3-phase, 200 to 240V: 0.5 to 15 hp (0.37 to 11 kW)
			3-phase, 380 to 480V: 0.5 to 5 hp (0.37 to 4 kW)	3-phase, 200 to 240V: 0.5 to 15 hp (0.37 to 11 kW)	3-phase, 380 to 480V: 0.5 to 30 hp (0.37 to 22 kW)	3-phase, 380 to 480V: 0.5 to 30 hp (0.37 to 22 kW)
				3-phase, 380 to 480V: 0.5 to 30 hp (0.37 to 22 kW)		
				3-phase, 500 to 600V: 1 to 15 hp (0.75 to 11 kW) <sup>1)</sup> 1 to 20 hp (0.75 to 15 kW)		
<b>Protection classes</b>	UL type 0/IP20	●	●	●	●	●
	UL type 1/IP21	-	-	-	○	-
	UL Type 12/IP54/IP55	-	-	-	-	-
	UL Type 4X/IP66/IP67	-	-	●	● <sup>1)</sup>	-
	UL type 3R	-	-	-	-	-
<b>Mounting arrangements</b>	Optimal for cabinet mounting	●	●	● <sup>8)</sup>	●	●
	Optimal for wall mounting	-	○	● <sup>1)</sup>	○	-
<b>Programming</b>	Parameter programming	●	●	●	●	●
	Sequence programming	-	-	-	●	● <sup>13)</sup>
<b>Human-Machine interface</b>	Basic control panel	-	-	-	○	-
	Assistant control panel	-	-	-	○/● <sup>1)</sup>	-
	Bluetooth enabled panel	-	-	-	-	○
	Integrated control panel	●	●	●	-	●
<b>Motor Control</b>	Scalar (V/Hz) selectable for linear (CT) or square function (VT)	Scalar (V/Hz) selectable for linear (CT) or square function (VT)	Open loop vector, Scalar (V/Hz), enhanced V/Hz or open loop vector	Open loop vector, Scalar (V/Hz) and Closed loop control	Open loop vector, Scalar (V/Hz) and Closed loop control - AC induction and PMAC motors	
<b>Ambient temperature</b>	-4 to 104°F (-20 to 40°C), 50 °C (122°F) with 15% derate, 55°C (131°C) with 25% derate No frost allowed.	14 to 104°F (-10 to +40°C), 122°F (+50°C) with derating No frost allowed.	UL Type 0: 14 to 104°F (-10 to 40°C), 122°F (50°C) with derate UL type 4X: 14 to 104°F (-10 to 40°C), No frost allowed.	14 to 104°F (-10 to 40°C), 122°F (50°C) with derating No frost allowed.	14 to 122°F (-10 to 50°C), Up to 140°F (60°C) with derating No frost allowed.	
<b>Inputs and outputs</b>	Digital inputs/outputs	3/0	5/0	4/0	5/1	4/2 <sup>5)</sup>
	Relay outputs	1	1	1 (+1 as option)	1 (+3 as option)	1 (+4 as option)
	Analog inputs/outputs	1/0	2/1	2/1	2/1	2
	Encoder feedback	-	-	-	○	●
<b>Supported fieldbus protocols</b>	Modbus RTU	-	-	●	○	●
	Profibus DP	-	-	-	○	●
	DeviceNet™	-	-	-	○	-
	ControlNet	-	-	-	○	-
	CANopen®	-	-	-	○	●
	Ethernet (Modbus/TCP)	-	-	-	○	●
	Ethernet (EtherNet/IP™)	-	-	-	○	●
	Ethernet (EtherCAT®)	-	-	-	○	●
	Ethernet (PROFINET IO)	-	-	-	○	●
	Ethernet (PowerLink)	-	-	-	-	●
<b>EMC compliance (EN 61800-3)</b>	C3, industrial use	○	●	○	●	○
	C2, commercial use (installation by EMC experts)	○	○	○	○	○
	C1, commercial use	○ (conductive emissions)	○ (conductive emissions)	○	○ (conductive emissions)	○
	Input reactors	-	○	○	○	○
	Output reactors	-	○	○	○	○
<b>Brake chopper</b>	-	●	Sizes 2 & 3 only	●	●	
<b>Suggested maximum motor cable length</b>	98.5 to 164 ft (30 to 50 m)	98.5 to 196.9 ft (30 to 60 m)	328 ft (100 m)	98.5 to 196.9 ft (30 to 60 m)	98.5 to 196.9 ft (30 to 60 m)	
<b>Switching frequency</b>	up to 16 kHz	up to 16 kHz	up to 32 kHz	up to 16 kHz	up to 12 kHz	
<b>Output frequency</b>	0-130Hz (0/250Hz) <sup>10)</sup>	0 to 500 Hz	0 to 500 Hz	0 to 599 Hz	0 to 599 Hz	
<b>Overload capacity</b>	150% for 60 s, 180% for 2s at start	150% for 60 s, 180% for 2 s	150% for 60 s, 175% for 2 s	150% for 60 s, 180% for 2 s	150% for 60 s, 180% for 2 s	
<b>Number of preset speeds</b>	1 <sup>10)</sup>	3	4	7	7	
<b>PC tools</b>	Drive commissioning tool	○	-	-	○	●
	Drive offline prog tool	-	○	-	○	●
	Drive dimensioning tool	-	-	-	-	●
<b>Approvals</b>	UL, cUL, CE, RMS, C-Tick, EAC	●	●	●	●	●
<b>RoHS compliance</b>	●	●	●	●	●	

● Standard  
○ Option  
— Not Available

<sup>1)</sup> IP66 product variants  
<sup>2)</sup> up to R2 as standard  
<sup>3)</sup> G1/G2 frames IP00  
<sup>4)</sup> Application Programming  
<sup>5)</sup> DO are DIO and can be used as DI

<sup>6)</sup> Frame dependent  
<sup>7)</sup> CC, PC, and PD product variants  
<sup>8)</sup> IP20 variant  
<sup>9)</sup> IP54 variant

<sup>10)</sup> Greater range when programmed with DriveConfig software  
<sup>11)</sup> I/O can be expanded with optional modules  
<sup>12)</sup> Eight digital outputs can be configured to be DI or DO  
<sup>13)</sup> ACS580-0P only

Specification	ACS310	ACS580	ACS880	DCS800
<b>Voltage and power ranges</b>	1-phase, 200 to 240 V: 0.5 to 5 hp (0.37 to 4 kW)	3-phase, 208 to 240V: 1 to 100 hp (0.75 to 75 kW)	3-phase, 208 to 240V: 0.75 to 100 hp (0.75 to 75 kW)	3-phase, 230 to 525 V: 5 to 3000 hp (4 to 2250 kW)
	3-phase, 200 to 240 V: 0.5 to 15 hp (0.37 to 11 kW)	3-phase, 380 to 480 V: 1 to 700 hp (0.75 to 522 kW)	3-phase, 380 to 500 V: 0.75 to 1950 hp (0.75 to 1500 kW)	3-phase, 600 V: 200 to 3250 hp (150 to 1700 kW)
	3-phase, 380 to 480 V: 0.5 to 30 hp (0.37 to 22 kW)	3-phase, 500 to 600 V: 2 to 250 hp (1.5 to 180 kW)	3-phase, 525 to 690V: 5 to 3300 hp (4 to 3200 kW)	3-phase, 700 V: 500 to 4000 hp (400 to 3000 kW)
				higher upon request
<b>Protection classes</b>	UL type 0/IP20	●	–	●
	UL type 1/IP21	○	●	–
	UL Type 12/IP54/IP55	–	●	–
	UL Type 4X/IP66/IP67	–	–	–
	UL type 3R	–	○ <sup>13)</sup>	–
<b>Mounting arrangements</b>	Optimal for cabinet mounting	●	● Requires flange mount kit	● Requires flange mount kit
	Optimal for wall mounting	○	●	–
<b>Programming</b>	Parameter programming	●	●	●
	Sequence programming	–	●	–
<b>Human-Machine interface</b>	Basic control panel	○	–	–
	Assistant control panel	○	●	○
	Bluetooth enabled panel	–	○	●
	Integrated control panel	–	–	–
<b>Motor Control</b>	Scalar (V/Hz) - Linear (CT), squared (VT), or user defined curve	Open Loop Vector, Scalar (V/Hz)	Direct Torque Control (DTC), Scalar (V/Hz)	–
<b>Ambient temperature</b>	14 to 104°F (-10 to +40°C), up to 50°C with 10% derate. No frost allowed.	5 to 122°F (-15 to +50°C) From 104 to 122°F (+40 to +50°C) with derating. No frost allowed.	5 to 131°F (-15 to +55°C) From 104 to 131°F (40 to 55°C) with derating. No frost allowed.	32 to 104°F (0 to 40°C) From 104 to 131°F (40 to 55°C) with derating. No frost allowed.
<b>Inputs and outputs</b>	Digital inputs/outputs	5/1	6/0	6/8 <sup>11,12)</sup>
	Relay outputs	1 (+3 as option)	3 + (3 as option)	3 <sup>11)</sup>
	Analog inputs/outputs	2/1	2 /2	2/2 <sup>11)</sup>
	Speed feedback	–	–	○
<b>Supported fieldbus protocols</b>	Modbus RTU	●	●	●/○
	Profibus DP	–	○	○
	DeviceNet™	–	○	○
	ControlNet	–	○	○
	CANopen®	–	○	○
	Ethernet (Modbus/TCP)	–	○	○
	Ethernet (EtherNet/IP™)	–	○	○
	Ethernet (EtherCAT®)	–	○	○
	Ethernet (PROFINET IO)	–	○	○
Ethernet (PowerLink)	–	○	○	
<b>EMC compliance (EN 61800-3)</b>	C3, industrial use	●	●	○
	C2, commercial use (installation by EMC experts)	●	●	○
	C1, commercial use	○ (conductive emissions)	○ (conductive emissions)	–
	Input reactors	○	●	● (built-in)
	Output reactors	○	○	○ (cabinets)
<b>Brake chopper</b>	–	R1-R3 Frames	●/○ <sup>6)</sup>	Not applicable
<b>Suggested maximum motor cable length</b>	98.5 to 196.9 ft (30 to 60 m)	300m	5000 ft / 1000 ft <sup>6)</sup> (150m / 300m) <sup>6)</sup>	Not applicable
<b>Switching frequency</b>	up to 16 kHz	2, 4, 8, 12 kHz	2.7 kHz (typical)	Not applicable
<b>Output frequency</b>	0 to 500 Hz	0 to 500Hz	0 to 500 Hz	Not applicable
<b>Overload capacity</b>	110% for 60 s, 180% for 2 s	110% for 1 minute every 10 minutes	110% for 60s, 150% for 60s	150% for 60 s, 150% for 30 s, 110% for 60 s
<b>Number of preset speeds</b>	7	7	7	4
<b>PC tools</b>	Drive commissioning tool	○	○	○
	Drive offline prog tool	○	○	–
	Drive dimensioning tool	–	○	○
<b>Approvals</b>	UL, cUL, CE, RMS, C-Tick, EAC	●	●	●
<b>RoHS compliance</b>	●	●	●	●

# ACS55, micro drives

## 0.25 to 3 hp (0.18 to 2.2 kW)

### What is it?

The ACS55 drive is a component that can be integrated easily into existing panels, replacing contactors and motor starters. Its compact size is ideal for new installations or whenever speed control of AC induction motors is needed. For users new to drives, its interface with DIP switches and trimmers is exceptionally intuitive.

The ACS55 drive meets the requirements of new drive users, installers, machine builders and panel builders.



Feature	Advantage	Benefit
<b>Single phase supply</b>	Suitable for single phase residential and commercial applications	Avoids cabling and installation costs associated with three-phase supplies
<b>Slim design</b>	Fits easily into a variety of cabinet designs	Cabinet size can be smaller or greater packing density can be achieved
<b>Flexible installation alternatives</b>	Screw or DIN rail mounting, sideways or side-by-side	One drive type can be used in various designs, saving installation costs and time
<b>High switching frequency</b>	Reduced motor noise	Does not disturb occupants of buildings
<b>Integrated EMC filter as standard</b>	High electromagnetic compatibility	Low EMC emissions in all environments
<b>Easy configuration</b>	Quick setup with DIP switches and trimmers	Substantial time savings. Minimal expertise needed.
<b>DriveConfig kit PC tool</b>	DriveConfig kit PC tool is used to set drive parameters and to upload the parameter set to a drive in seconds, even without a power connection to the drive. The DIP switches and trimmers on the front panel of the drive are disabled after using the DriveConfig kit. This prevents the end users from altering the drive configuration.	Time savings with multiple drives. Drive configuration protected from end user alterations.

For additional technical information, see the ACS55 Technical Catalog (3AUA0000163305) or [www.abb.com/drives](http://www.abb.com/drives).

# ACS150, micro drives

## 0.25 to 3 hp (0.18 to 2.2 kW)

**What is it?**

The ACS150 drive is a component that is brought together with other components and includes, as standard, all necessary functions and interfaces for typical applications with AC induction motors. This makes the product selection very easy.

The ACS150 drive meets the requirements of new drive users, installers, machine builders and panel builders.



Feature	Advantage	Benefit
<b>User-friendly LCD control panel</b>	Clear alphanumeric display Easy setup and use	Time savings
<b>Flexible mounting alternatives</b>	Screw or DIN rail mounting, sideways or side-by-side	One drive type can be used in various designs, saving installation costs and time
<b>Integrated EMC filter</b>	High electromagnetic compatibility	Low EMC emissions in selected environments
<b>Built-in brake chopper as standard</b>	No need for an external brake chopper	Space savings, reduced installation cost
<b>Embedded potentiometer</b>	Easy to adjust output frequency	Time savings
<b>PID control</b>	Simple integration to process control	Cost savings as a result of less cabling
<b>FlashDrop tool</b>	FlashDrop is a hand held tool that is used to quickly and easily set drive parameters. FlashDrop tool uploads drive parameters directly to unpowered drives. The tool can copy parameters from one drive to another or between a PC and a drive.	Time savings, especially with multiple drives

For additional technical information, see the ACS150 Technical Catalog (3AUA0000085631) or [www.abb.com/drives](http://www.abb.com/drives).

# ACS255, micro drives

## 0.5 to 30 hp (0.37 to 22 kW)

### What is it?

The ACS255 micro drive offers easy to use and compact solutions for general purpose, low power applications, including mixers, pumps, fans, conveyors. All variants include a built-in Modbus RTU serial communication to provide straightforward integration with control and monitoring systems.



Available in IP20 and IP66/NEMA4x enclosures.

Feature	Benefit	Result
<b>User-friendly LCD control panel</b>	Clear alphanumeric display Easy setup and use	Time savings with programming and monitoring
<b>Optional front mounted operator controls (IP66 variant)</b>	Allows the drive to be mounted on the machine close to the operator	Cost savings with operator controls already mounted on the drive – no need for custom panels
<b>Flexible mounting alternatives (IP20 variant)</b>	Wall or DIN rail mounting without extra accessory kits	One drive type can be used in various designs, saving installation costs and time
<b>PI control</b>	Simple integration to process control	Cost savings with PLC functionality built into the drive
<b>Slide-out help card (IP20 variant)</b>	Ready reference, right on the drive	Time savings with setup and programming
<b>Epoxy coated heatsink (IP66 variant)</b>	Protects the heatsink from harsh washdown chemicals	Cost savings with extended life in the harshest environments
<b>Enhanced V/Hz control for variable or constant torque applications</b>	Optimized performance and energy savings for all applications	One drive can efficiently power both VT or CT applications
<b>Flow through wiring (IP20 variant)</b>	Facilitates panel layout, or contactor replacement, with power leads in at the top and motor cables out at the bottom	Time and cost savings for panel builders
<b>Separate terminal cover (IP66 variant)</b>	No need to expose sensitive electronics to the environment when connecting and commissioning the drive	Time savings with easy access to connection terminals
<b>Built-in brake chopper as standard (sizes 2, 3, &amp; 4)</b>	No need for an external brake chopper	Space savings, reduced installation cost
<b>Safe torque off function (SIL3) as standard (600V only)</b>	Built-in and certified function that is used for prevention of an unexpected startup and other stopping related functions	Reduces the need for external safety components. Helps machine builders to fulfill the requirements of Machinery Directive 2006/42/EC
<b>High protection class variant (IP20 variant, up to 20 hp) (IP66 variant, up to 30 hp)</b>	No need to design special enclosure for applications that require high ingress protection	Time and cost savings
<b>CopyStick tool</b>	CopyStick is used to quickly and easily set drive parameters. The tool uploads drive parameters directly to unpowered drives. The tool can copy parameters from one drive to another or between a PC and a drive.	Time savings, especially with multiple drives

For additional technical information, see the ACS255 documentation (ACS255-PHPB01U-EN, ACS255-PHPB02U-EN, and ACS255-PHPB03U-EN) or [www.abb.com/drives](http://www.abb.com/drives).

# ACS355, machinery drives

## 0.5 to 30 hp (0.37 to 22 kW)

### What is it?

The ACS355 is designed to be the fastest drive in terms of installation, setting parameters and commissioning. The drive is user-friendly, yet provides a wide range of built-in technology such as the safe torque off functionality and sequence programming which reduce the need for additional control electronics. The product offers options and diverse functionality to cater to the needs set for speed and torque control of AC induction and permanent magnet motors.



The ACS355 drive meets the requirements of new drive users, installers, machine builders, system integrators and panel builders.

Feature	Advantage	Benefit
<b>Same height and depth across power range</b>	Effective space usage	Less engineering and installation time
<b>Assistant control panel with Help functions</b>	Quick setup, easy configuration and commissioning, rapid fault diagnosis	Substantial time savings locating faults and implementing repairs, thereby reducing maintenance costs
<b>Scalar and vector control</b>	Optimum performance depending on application	Ensures the end-product is produced cost efficiently
<b>Sequence programming</b>	Logic programming included as standard with PLC-like functions	Reduces components and wiring in control system
<b>Integrated EMC filter</b>	High electromagnetic compatibility	Low EMC emissions in selected environments
<b>Built-in brake chopper as standard</b>	No need for an external brake chopper	Space savings, reduced installation cost
<b>Safe torque off function (SIL3) as standard</b>	Built-in and certified function that is used for prevention of an unexpected startup and other stopping related functions	Reduces the need for external safety components. Helps machine builders to fulfill the requirements of Machinery Directive 2006/42/EC.
<b>High protection class variant (IP66/67) up to 7.5 kW</b>	No need to design special enclosure for applications that require high ingress protection	Time and cost savings
<b>Product variant for solar pumps</b>	Drive converts PV energy from solar panels to AC current, it can be operated independent from the grid.	Long life time and reduced maintenance costs, energy use and pollution. Improved reliability in electricity supply.
<b>FlashDrop tool</b>	FlashDrop is used to quickly and easily set drive parameters. FlashDrop tool uploads drive parameters directly to unpowered drives. The tool can copy parameters from one drive to another or between a PC and a drive.	Time savings, especially with multiple drives

For additional technical information, see the ACS355 Technical Catalog (3AUA0000081917) or [www.abb.com/drives](http://www.abb.com/drives).

# ACS380, machinery drives

## 0.5 to 30 hp (0.37 to 22kW)

### What is it?

The ACS380 is a compact machinery drive and a part of the ABB family of all-compatible drives. It is designed to meet the needs of demanding constant torque applications in the food and beverage, material handling, and compact machinery industry segments.

It is the first compact industrial drive available with a graphical icon-based control panel to simplify setup, operation, and data gathering, while removing language barriers for a drive/control interface.

The ACS380 achieves a new level of high performance motor control with the ability to power AC induction, permanent magnet AC, and SynRM motors.



Feature	Advantage	Benefit
<b>Optimized cooling configuration</b>	Allows drive operation up to 50 °C at full rating and up to 60 °C with derating. Channels most of the cooling air over the heatsink and DC capacitors and less over the control board	Minimizes dust and dirt contamination of sensitive electronics, extending the drives lifespan and minimizing maintenance cost
<b>Same height and depth across power range</b>	More efficient panel layout and installation	Reduced design and installation time
<b>Integrated graphic icon-based control panel</b>	Quick setup, easy configuration and commissioning, rapid fault diagnosis	Substantial time savings locating faults and implementing repairs, thereby reducing maintenance costs
<b>Adaptive programming with sequence programming</b>	State machine programming with PLC-like functionality included as standard	Reduces cost for components and integration in the control system
<b>Integrated EMC filter options</b>	Standard or high electromagnetic compatibility	Low EMC emissions in the local environment extends the life and usability of sensitive components located near the drive.
<b>Built-in brake chopper as standard</b>	No need for an external brake chopper	Space savings, reduced installation cost
<b>Safe torque off function (SIL3) as standard</b>	Built-in and certified function that is used for prevention of an unexpected startup and other stopping related functions.	Reduces the need for external safety components. Helps machine builders to fulfill the requirements of Machinery Directive 2006/42/EC.
<b>Preconfigured connectivity for all major machine automation fieldbus protocols</b>	At power-up, the installed fieldbus module automatically configures drive parameters allowing drive programming directly from the PLC.	Time is saved by not having to configure drive parameters to enable PLC direct control
<b>Cold Configuration Tool</b>	The CCA-01 is used to connect a PC to an unpowered drive for loading or managing drive parameters using DriveComposer. Direct connection between the drive and PC is possible using the BCBL-01 cable and the RJ-25 panel port on the top of the ACS380.	Saves time for OEM's programming multiple drives for production or to send out as machine replacements

# ACS310, general purpose drives

## 0.5 to 30 hp (0.37 to 22 kW)

**What is it?**

The ACS310 drive is designed for squared torque applications such as booster pumps and supply and return fans. The drive includes a powerful set of features which benefit pump and fan applications including built-in PID controllers and pump and fan control (PFC) that varies the drive's performance in response to changes in pressure, flow or other external data.

The ACS310 drive meets the requirements of new drive users, installers, machine builders, system integrators and panel builders.



Feature	Advantage	Benefit
<b>Same height and depth across power range</b>	Effective space usage	Less engineering and installation time
<b>Commissioning assistants</b>	Easy set up of parameters for PID controllers, real-time clock, serial communication, drive optimizer and drive startup	Time savings. Ensures all required parameters are set.
<b>Pump and fan control (PFC)</b>	One drive controls several pumps or fans. Auxiliary motors are driven according to the needed pump/fan capacity. One motor can be disengaged from the mains supply while others continue operating in parallel.	Saves cost of additional drives and external PLC. Longer life for pump or fan system while reducing maintenance time and costs. Maintenance can be carried out safely without stopping the process.
<b>Pump protection functions</b>	Preprogrammed features such as pipe cleaning, pipefill, inlet/outlet pressure supervision and detection of under- or overload	Reduces maintenance costs. Longer life for pump and fan system.
<b>PID controllers</b>	Varies the drive's performance according to the need of the application	Enhances production output, stability and accuracy
<b>Energy efficiency counters</b>	Illustrates saved energy, CO <sub>2</sub> emissions and energy cost in local currency using a baseline determined from the energy consumed when the fan or pump is used directly online	Shows direct impact on energy bill and helps control operational expenditure (OPEX)
<b>Embedded Modbus EIA-485 fieldbus interface</b>	No need for external fieldbus options. Integrated and compact design.	Saves cost of an external fieldbus device. Increases reliability
<b>FlashDrop tool</b>	FlashDrop is a hand held tool that is used to quickly and easily set drive parameters. FlashDrop tool uploads drive parameters directly to unpowered drives. The tool can copy parameters from one drive to another or between a PC and a drive.	Time savings, especially with multiple drives

For additional technical information, see the ACS310 Technical Catalog (3UA0000159910) or [www.abb.com/drives](http://www.abb.com/drives).

# ACS580, general purpose drives

## 1 to 700 hp (0.75 to 522 kW)

### What is it?

The ACS580 is plug-in ready to control your pumps, fans, compressors, conveyors, mixers and many other variable and constant torque applications. Most essential features are built-in as standard, simplifying drive selection, and making additional hardware unnecessary. Straightforward settings menu and assistants enable fast setup, commissioning, use and maintenance.

The ACS580 drive meets the requirements of drive users, installers, electricians, machine builders, system integrators and panel builders.



Feature	Advantage	Benefit
<b>Control panel and Primary settings menu with multi-language support</b>	Effortless commissioning, configuration, monitoring and defect tracking. No need to know parameters with the Primary settings menu.	Substantial time savings. Drive speaks your local language. No need for manual as the help function is already built-in to the panel.
<b>Installation and commissioning</b>	Highest power density against most of the comparable products in the market. Multiple drives can be installed side-by-side.	Cost, space and time savings
<b>Connect to public low voltage networks</b>	Integrated C2 EMC filter (1 <sup>st</sup> environment) for frame sizes R1 to R9 or C3 EMC filter (2 <sup>nd</sup> environment) for frame sizes R10 to R11 and swinging choke (compatible harmonics levels) as standard	Ensure that the product can be used on public installations and therefore no additional filters or engineering is required.
<b>Energy efficiency functionality</b>	The built-in energy efficiency calculators monitor used and saved kWh, CO <sub>2</sub> reduction and money saved. The energy optimizer ensures the maximum torque per ampere. The wall-mounted drive fulfills the highest IE2 drive (EN 50598-2) energy efficiency class and is compatible with high-efficiency IE4 motors.	Energy savings through improved energy management
<b>Standard safety functions</b>	Integrated, certified safety with SIL3/PL e safe torque off (STO), fulfilling the machinery directive.	Fulfills Machinery Directive 2006/42/EC, EN/IEC 61800-5-2:2007. Cost-effective and certified solution for safe machine maintenance.

For additional technical information, see the ACS580 Technical Catalog (ACS580-PHTC01U-EN) or [www.abb.com/drives](http://www.abb.com/drives).

# ACS880, industrial drives

## 0.75 to 3300 hp (0.75 to 3200 kW)

**What is it?**

The all-compatible ACS880 industrial drives are designed to tackle any of your motor-driven applications, in any industries, whatever the power range. Compatible with virtually all of your processes, automation systems, users and business requirements, the innovation behind the ACS880 drives is our drives architecture that simplifies operation, optimizes energy efficiency and helps maximize process output. The ACS880 series consists of single drives, multidrives and drive modules.



These drives are also available as regenerative and ultra-low harmonic constructions.

Feature	Advantage	Benefit
<b>Compact wall-mounted and cabinet-built drives and drives modules, with a wide power and voltage range</b>	Designed to provide customers across industries and applications with unprecedented levels of compatibility and flexibility. Drives are built to order with a wide range of options such as EMC filters, braking options and different enclosure variants.	Simplifies configuration and ordering process. Reduces training costs. Reduces service and maintenance costs.
<b>Controls virtually any type of motor</b>	Our robust industrial drives ensure an energy efficient and reliable motor controller with significant cost savings for the user.	Reduces costs by improving energy efficiency.
<b>Direct torque control (DTC) as standard</b>	Accurate, dynamic and static speed and torque control. Excellent process control even without pulse encoder. High overload and high starting torque. Less noise during motor operation. Output frequency up to 500 Hz. Enhanced motor identification at standstill.	Improves product quality, productivity and reliability. Reduces maintenance costs.
<b>Integrated safety features including safe torque off (STO) as standard</b>	Safe torque off is built-in as standard. An optional safety functions module provides extended safety functions.	Simplifies the configuration. Reduces product installation footprint. Reduces the need for additional external safety components.
<b>Removable memory unit</b>	The removable memory unit stores the software that includes user settings, parameter settings and motor data.	Easy to install, update and replace.
<b>Remote monitoring possibilities</b>	With a built-in web server, NETA-21 enables worldwide access to the drive via the Internet or local Ethernet network.	Increases productivity and reduces downtime with instant access to drives
<b>Communication with all major automation networks</b>	Fieldbus adapters enable connectivity with all major automation networks. The plug-in fieldbus adapter module can easily be mounted inside the drive.	Reduces wiring costs compared to traditional I/O connections. Simplifies the installation and commissioning process

For additional technical information, see the ACS880 Technical Catalogs (3AUA0000139403, 3AUA0000139404, 3AUA0000164773) or [www.abb.com/drives](http://www.abb.com/drives).

# DCS800, DC drives

## 5 to 4000 hp (4 to 3000 kW)

### What is it?

The DCS800 DC industrial drive from ABB combines a powerful controller with a thyristor power platform that has been proven in factories all over the world. The DCS800 boasts a wider power range than any other DC drive on the market. Special features make installation and configuration simple and allow you to customize the application to your needs. Both regenerative and non-regenerative drives are available. ABB also offers rebuild and upgrade kits specifically for retrofits to update the controls on existing DC drives. Panel drives are also available which include the DCS800 module and associated system components mounted and wired on a sub-panel.



Feature	Advantage	Benefit
<b>20 - 20,000 A; up to 5200 A in a single module package</b>	Widest available power range in the industry Highest power rating in the industry	The DCS800 will work regardless of the size of the load Saves the time and expense of paralleling drives
<b>250 - 1500 Vdc</b>	Widest supply voltage range in the industry	The DCS800 will work regardless of the size of the incoming voltage
<b>Adaptive Programming</b>	The user can easily customize the drive to their needs	The DCS800 will work in almost any application
<b>Compact design</b>	Highest power-to-size ratio in its class	Smaller enclosures; Makes system wiring faster and easier
<b>Controls can be replaced without replacing the power section</b>	Upgrade without replacing properly-functioning power components	Less costly upgrades
<b>DriveWindow Light</b>	Includes a commissioning wizard at no extra charge, making commissioning and adjustments easier	Faster commissioning; easier to make adjustments
<b>Multi-lingual control panel</b>	The DCS800 can be used in user's native language	Makes it easier to specify and order a drive
<b>Wide range of high-speed fieldbus modules</b>	The DCS800 can communicate with almost any PLC	Eliminates need to modify the PLC when retrofitting the drive, reducing cost
<b>ControlBuilder / IEC 61131 Option</b>	The drive is fully customizable	The DCS800 will work in highly unusual applications or when the customer needs some special firmware features
<b>DCS800-EP drive module and system components pre-wired on a panel</b>	System components are preselected, wired and tested	Less engineering, easier to implement, faster to commission
<b>DCS800-EP are designed so components are accessible for maintenance</b>	Any part is able to be replaced quickly	Less down time

For additional technical information, see the DCS800 Technical Catalog (DCS800-PHTC01U-EN) or [www.abb.com/drives](http://www.abb.com/drives).  
FlexPak® 3000 is a registered trademark of Rockwell Automation, Inc.

# Softstarters

## Overview

### Which softstarter series?

ABB offers three different softstarter series, and the first step for the selection is to determine what softstarter series that will fulfill the needs of the motor and application. In the selection guide to the right, a comprehensive softstarter feature and functionality overview is provided to help with this selection.

When the softstarter series is selected, remember the different current ratings of the three different series and ensure that the motor nominal current matches this:

- PSR: 1...105 Ampere, 208...600 V
- PSE: 6...370 Ampere, 208...600 V
- PSTX: 9...1250 Ampere, 208...600/690 V

### PSTX – the advanced range

- When full control and motor protection is needed
- When an advanced softstarter with an extensive functionality is needed
- When motor is connected inside delta or connected to 690 V power system

### PSE – the efficient range

- When there is limited space
- When common softstarter functions and protections are needed
- When operating a pump

### PSR – the compact range

- When standard softstarter benefits and values are requested
- When operating a small motor
- When up to 100 starts per hour are requested

### Altitude formula

De-rate for altitudes between 1000-4000 m or 3280-13123 ft with the following formula for all softstarters:

In meters: % of I<sub>e</sub> = 100 – (x-1000)/150

In feet: % of FLA = 100 – (y-3280)/480

Where x/y is the actual altitude in m/ft

### Temperature formula

#### PSTX and PSR

In Celsius: 40 °C to 60 °C: Reduce I<sub>e</sub> with 0.8%/°C

In Fahrenheit: 104 °C to 140 °F: Reduce FLA with 0.44%/°F

#### PSE

In Celsius: 40 °C to 60 °C: Reduce I<sub>e</sub> with 0.6%/°C

In Fahrenheit: 104 °C to 140 °F: Reduce FLA with 0.33%/°F

### Typical applications

Normal duty start	Heavy duty
Bow thrusters	Centrifugal fan
Compressors	Crusher
Elevator	Mixer
Centrifugal pump	Conveyor belt (long)
Conveyor belt (short)	Mill
Escalators	Stirrer

Feature	PSR	PSE	PSTX	
Current limit	-	●	●	Secure motor reliability
Current limit ramp and dual current limit	-	-	●	
Electronic motor overload protection	-	●	●	
Dual overload protection	-	-	●	
Underload protection	-	●	●	
Power factor underload protection	-	-	●	
Locked rotor protection	-	●	●	
Current/Voltage imbalance protection	-	-	●	
Phase reversal protection	-	-	●	
Customer defined protection	-	-	●	
Motor heating	-	-	●	
PTC/PT100 input for motor protection	-	-	●	
Overvoltage/undervoltage protection	-	-	●	
Earth-fault protection	-	-	●	
Built-in bypass	●	●	●	Improve installation efficiency
Inside-delta connection possible	-	-	●	
Graphical display and keypad	-	●	●	
Detachable keypad	-	-	●	
Motor runtime and start count	-	-	●	
Programmable warning functions	-	-	●	
Diagnostics	-	-	●	
Overload time-to-trip	-	-	●	
Overload time-to-cool	-	-	●	
Analog output	-	●	●	
Fieldbus communication	-	●	●	
Event log	-	○	●	
Multiple languages	-	-	17	
Electricity metering	-	-	●	
Torque control	-	●	●	Increase application productivity
Torque limit	-	-	●	
Coated PCBA	-	●	●	
Limp mode	-	-	●	
Jog with slow speed forward/ reverse	-	-	●	
Dynamic brake	-	-	●	
Stand still brake	-	-	●	
Sequence start	-	-	●	
Full voltage start	-	-	●	
Kick start	-	●	●	
Automatic pump cleaning	-	-	●	

● = standard  
○ = option  
— = not available

# Softstarters

## PSR - The compact range

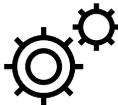


### Technical data

- Operational voltage: 208...600 V AC
- Wide rated control supply voltage: 100...240 V AC, 50/60 Hz or 24 V AC/DC
- Rated operational current: 3...105 A
- Two-phase controlled
- Soft start with voltage ramp
- Soft stop with voltage ramp
- Built-in bypass for energy saving and easy installation
- Easy setup by three potentiometers
- Run and Top of Ramp relays available for monitoring
- Connection kits available for connection to ABB's manual motor starters (MMS)

### Certifications and approvals:

- CE, cULus, CCC, EAC, ANCE, C-tick, PRS



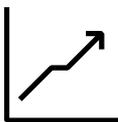
### Reduce the electrical stresses and keep the motor protected with the MMS

The PSR reduces the starting current for the motor. The possibility to connect it to the manual motor starter makes it possible to build a compact and complete starting solution with overload and short-circuit protection.



### Saving time and money with built-in bypass and easy set-up

On the PSR, the bypass is built in and verified by ABB, saving you time during installation and space in your panel. Set-up is done through three potentiometers making it very fast and easy.



### Reduce the mechanical stresses on your motor

Soft start and stop with PSR will reduce mechanical wear and tear on the application and increase the availability and uptime.

# Softstarters

## PSE - The efficient range



### Technical data

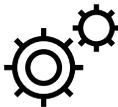
- Operational voltage: 208...600 V AC
- Wide rated control supply voltage: 100...250 V AC, 50/60 Hz
- Rated operational current: 18...370 A
- Two-phase controlled
- Voltage ramp and torque control for both start and stop
- Current limit
- Kick-start
- Built-in bypass for energy saving and easy installation
- Coated PCBA protecting from dust, moist and corrosive atmosphere
- Illuminated display that uses symbols to become language neutral
- External keypad rated IP66 (Type 1, 4X,12) as an option
- Built-in Modbus RTU for monitoring and control
- Analog output for display of motor current
- Electronic overload protection
- Underload protection
- Locked rotor protection

### Available communication protocols:

- Built-in Modbus RTU

### Certifications and approvals:

- CE, cULus, CCC, EAC, ANCE, C-tick, ABS, DNV GL, Lloyd's Register, CCS, PRS, Class NK



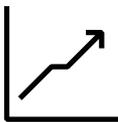
### Basic motor protection and current limit

The PSE includes the most important protections for handling different load situations that can happen to pumps e.g. overload and underload. The current limit gives you more control of the motor during start and allows you to start your motor in weaker networks.



### Saving time and money with built-in bypass and compact design

On the PSE, the bypass is built in and verified by ABB, saving you time during installation and space in your panel. The keypad is language neutral and illuminated for easy set-up and operation in field. The compact design makes installation fast and easy.



### Torque control for elimination of water hammering in pumps

Torque control is the most efficient way to stop a full speed pump. The PSE has a special torque stop ramp that is designed together with a pump manufacturer to eliminate water hammering in an optimal way.

# Softstarters

## PSTX - The advanced range



### Technical data

- Operational voltage: 208...690 VAC
- Wide rated control supply voltage: 100...250 V, 50/60 Hz
- PSTX rated operational current: 30...1250 A (inside-delta: 2160 A)
- Three-phase controlled
- Both in-line and inside-delta connection
- Coated circuit boards protecting from dust, moist and corrosive atmosphere
- Detachable keypad rated IP66 (Type 1, 4X,12)
- Graphical display with 17 languages for easy setup and operation
- Built-in bypass for energy saving and easy installation
- Built-in Modbus RTU for monitoring and control

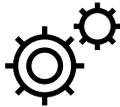
- Support for all major communication protocols
- Analog output for measurement of current, voltage, power factor etc.

### Available communication protocols:

- Built-in Modbus RTU
- Anybus/FBP
- Modbus RTU
- PROFIBUS
- DeviceNet
- EtherNet/IP
- PROFINET

### Certifications and approvals:

- CE, cULus, CCC, EAC, ANCE, C-tick, ABS, DNV GL, Lloyd's Register, CCS, PRS, Class NK



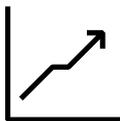
### Complete motor protection

The PSTX offers complete motor protection in only one unit and is able to handle both load and network irregularities. PT-100, earth fault protection and over/under voltage protection along with many other functions keep your motor safer than ever



### Built-in bypass saves time and energy

When reaching full speed, the PSTX will activate its bypass. This saves energy while reducing the softstarter's heat generation. On the PSTX, the bypass is built in and verified by ABB, saving you time during installation and space in your panel.



### Complete control of pumps

Time to use your processes to their full potential. The PSTX features many application enhancing features, including torque control: the most efficient way to start and stop pumps. The pump cleaning feature can reverse pump flow and clean out pipes, securing uptime of your pump system.

# A lifetime of peak performance

You're in control of every life cycle phase of your drives and softstarters. At the heart of drive and softstarter services is a four-phase product life cycle management model. This model defines the services recommended and available throughout drives and softstarters lifespan.

Now it's easy for you to see the exact service and maintenance available for your drives and softstarters.

## ABB drives and softstarters life cycle phases explained:



	Full range of life cycle services and support	Limited range of life cycle services and support	Replacement and end-of-life services
Product	Product is in active sales and manufacturing phase.	Serial production has ceased. Product may be available for plant extensions, as a spare part or for installed base renewal.	Product is no longer available.
Services	Full range of life cycle services is available.	Full range of life cycle services is available. Product enhancements may be available through upgrade and retrofit solutions.	Limited range of life cycle services is available. Spare parts availability is limited to available stock.

### Keeping you informed

We notify you every step of the way using life cycle status statements and announcements.

Your benefit is clear information about your drives' status and precise services available. It helps you plan the preferred service actions ahead of time and make sure that continuous support is always available.

### Step 1

#### Life Cycle Status Announcement

Provides early information about the upcoming life cycle phase change and how it affects the availability of services.

### Step 2

#### Life Cycle Status Statement

Provides information about the drive's current life cycle status, availability of product and services, life cycle plan and recommended actions.

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# Introducing the most extensive drives and softstarters portfolio in the world



**ABB low voltage AC drives**

The ABB low voltage AC drives product range, from 0.18 to 5600 kW, is the widest available from any manufacturer. These drives are the global benchmark that signifies reliability, simplicity, flexibility and ingenuity throughout the entire life cycle of the drive.

Several ABB drives feature calculators that provide energy consumption data. This information can be used to further analyze and tune a process for even greater energy savings.

The portfolio is supported by a selection of PC tools, fieldbus and communication options.

**ABB micro drives**

ABB micro drives are suitable for many low power applications such as pumps, fans and conveyors. The focus in our design has been the easy integration into machines, which provides flexible mounting alternatives and straightforward commissioning.

**ABB general purpose drives**

ABB general purpose drives are ideal in those situations where there is a need for simplicity to install, commission and use. They are designed to control a wide range of standard drives applications, including pump, fan and constant torque use, such as conveyors.

**ABB machinery drives**

ABB machinery drives can be configured to meet the precise needs of industries and order-based configuration is an integral part of the offering. Covering a wide power and voltage range with standard and optional features, the drives are readily programmable, making their adaptation to different applications easy.

**ABB industrial drives**

The ABB industrial drive portfolio is designed for heavy industrial applications such as those found in pulp and paper, metals, mining, cement, power, chemical, oil and gas, water and wastewater and food and beverage. Drives adapted and approved for use in the marine environment are also included within this portfolio.

**Industry specific drives**

Our industry specific ABB drives provide our customers with dedicated drive solutions for AC motor control used in industries such as HVAC and water and wastewater. Working closely with these industries, we have developed targeted functionality to help you improve your overall operating performance while also helping to reduce energy use. Built-in application macros in the drives help you easily setup and tailor processes.

**ABB DC drives**

ABB's DC drive portfolio, from 9 to 18000 kW, provides the highest power-to-size ratio on the market. The drives are designed for most industries including metals, cement, mining, pulp and paper, printing, food and beverage, wire manufacturing, test rigs, ski lift and cranes. ABB DC drives are available as complete cabinets, modules for cabinet assembly, and as retrofit kits. With built-in field exciters and integrated PLC's, they are the best DC drives choice for all new and retrofit applications.

**ABB softstarters**

A softstarter is the optimal compromise between a direct on-line or star delta starter and an advanced variable speed drive in many motor applications. Like direct on-line or star delta starters, it is used in full-speed applications. Like variable speed drives, it can perform soft starts and stops.

To find more information please visit:

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

[www.new.abb.com/low-voltage/products/softstarters](http://www.new.abb.com/low-voltage/products/softstarters)

# Services to match your needs

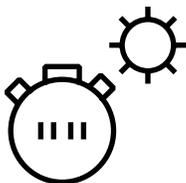
Your service needs depend on your operation, life cycle of your equipment and business priorities. We have identified our customers' four most common needs and defined service options to satisfy them. What is your choice to keep your drives at peak performance?

## Is uptime your priority?

Keep your drives and softstarters running with precisely planned and executed maintenance.

### Example services include:

- ABB Ability Life Cycle Assessment
- Installation and Commissioning
- Spare Parts
- Preventive Maintenance
- Reconditioning
- ABB Drive and Softstarter Care agreement
- Drive and Softstarter Exchange



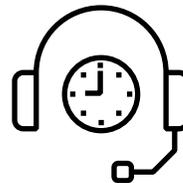
Operational efficiency

## Is rapid response a key consideration?

If your drives and softstarters require immediate action, our global network is at your service.

### Example services include:

- Technical Support
- On-site Repair
- ABB Ability Remote Assistance
- Response time agreements
- Training



Rapid response

# Drives and softstarters service

## Your choice, your future

### The future of your drives and softstarters depends on the service you choose.

Whatever you choose, it should be a well-informed decision. No guesswork. We have the expertise and experience to help you find and implement the right service for your drive equipment. You can start by asking yourself these two critical questions:

- Why should my drive and softstarter be serviced?
- What would my optimal service options be?

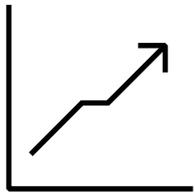
From here, you have our guidance and full support along the course you take, throughout the entire lifetime of your drives.

### Need to extend your assets' lifetime?

Maximize your drive's lifetime with our services.

#### Example services include:

- ABB Ability Life Cycle Assessment
- Upgrades, Retrofits and Modernization
- Replacement, Disposal and Recycling



Life cycle management

### Your choice, your business efficiency

ABB Drive Care agreement lets you focus on your core business. A selection of predefined service options matching your needs provides optimal, more reliable performance, extended drive and softstarter lifetime and improved cost control. So you can reduce the risk of unplanned downtime and find it easier to budget for maintenance.

### We can help you more by knowing where you are!

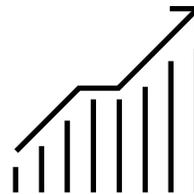
Register your drive and softstarter at [www.abb.com/drivereg](http://www.abb.com/drivereg) for extended warranty options and other benefits.

### Is performance most critical to your operation?

Get optimal performance out of your machinery and systems.

#### Example services include:

- ABB Ability Remote Services
- Engineering and Consulting
- Inspection and Diagnostics
- Upgrades, Retrofits and Modernization
- Workshop Repair
- Tailored services



Performance improvement



—  
For more information, please contact  
your local ABB representative or visit

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

**[www.new.abb.com/low-voltage/products/softstarters](http://www.new.abb.com/low-voltage/products/softstarters)**

