ABB drives for HVAC applications

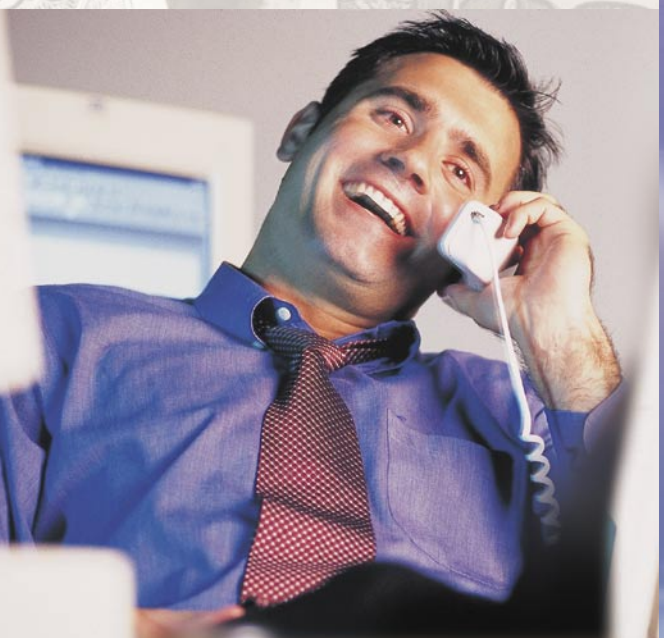
ACH550, 1 to 500 Hp

Drive^{IT} Low Voltage AC Drive

Peace of Mind

Facility Managers Say...

- "As the U.S. HVAC Market Leader and the world's largest manufacturer of Adjustable Frequency Drives, I know that ABB will be here in 10 years time and beyond. This is the most important guarantee you can give me."
- "With ABB's standard built-in hardware like the 5% swinging choke and the EMI / RFI filter, I know that any sensitive equipment in my facility will not be adversely affected by drive operaton."
- "I love the Help button. I call it my panic button – it quite simply is always available to guide me with useful information."
- "The Maintenance Assistant is another great feature of the ABB Drive. I simply do not need to worry about when it is time to service the equipment. The drive tells me when it is time to send people to perform maintenance."



Wide power range
from 1 to 100 Hp, @ 208/240 V or 2 to 500 Hp @ 380/480 V, covering the vast majority of HVAC applications.

Built-in EMI/RFI filters
The ACH Series Drive meets the EMC product standard EN61800-3 for the 1st Environment. These filters eliminate the need for any additional external filtering hardware.

Built-in timers
External timer circuits are no longer needed. Built-in timers - utilizing the real-time clock - allow starting and stopping the drive or changing the speed according to the time of day or night. Relay outputs can be operated with timers to control any auxiliary equipment on site.

N2, FLN and Modbus embedded
Commonly used HVAC fieldbuses are embedded into the memory of the drive, ensuring that they are always there if you need them. ABB has a long history in building automation, with more than 400,000 installed drives utilizing serial communications.

UL Type 1

LonWorks and Profibus
LonWorks, Profibus and other plug-in modules fit under the cover of the drive. A single twisted pair avoids great lengths of conventional cabling, reducing cost and increasing system reliability.

Built-in!

Swinging reactor - up to 64% less harmonics
ABB's patent-pending swinging choke means the ACH Series Drive reduces harmonics by up to 64% at partial loads when compared to a PWM AFD with no chokes. There is no need to oversize the supply choke.

Pre-configured HVAC application macros
14 different HVAC application macros are pre-programmed into the HVAC drive. Application macros for supply and return fans, cooling tower fans, booster pumps and condensers are available, just to name a few. The user can create two additional application macros, selectable manually or through a digital input. To illustrate this, the user can create "summer" and "winter" application macros and select between these according to the time of the year.

UL Type 12

The motor can deliver full output at 40 °C - shouldn't the AFD do the same?
ABB's HVAC drive is rated for continuous operation to 40 °C with full current, without being compromised by temperature variations within any 24-hour period. Full circulation is available, precisely when needed - usually, when it is hot outside. Similarly, Type 12 units can be operated without the need for de-rating up to 40°C. And, at 50°C, only 10% de-rating is required for both UL Type 1 and UL Type 12.

A Contractor's Point of View...

- "With the Hand Macro, I can move air to dry out the new construction paint and drywall mud without calling for a certified start-up. There's no need for multiple trips to my job site by the ABB start-up Engineer to commission the drives, and that saves me money."
- "UL Type 12 enclosures keep the drive electronics free from drywall dust and debris during the construction process."
- "ABB ACH Series Drive enclosures are UL Listed and UL Plenum Rated. I can mount the drive in most locations without worries."
- "I don't have to search for external components like timers and PID contollers and then worry about their compatibility. It's all there, in the drive"

Peace of Mind –

Feedback From Temperature Control Contractors...

- **"ABB understands the HVAC Market. I save time and money because I do not need to supply interposing relays and control logic to accomplish 'real world' functions such as Fireman's override and damper end-switch proof. ABB has these and many more features built-in."**
- **"Finally, a BACnet-compatible HVAC drive without the need for expensive and unwieldy third-party gateways."**
- **"The ABB ACH Series Drive is actually a drive and unitary controller in one. I have 13 free I/O points with every ABB drive provided!"**
- **"The second PID loop built into the ABB HVAC Drive allows me to control cooling tower bypass valves or other control valves with no additional hardware or cost."**
- **"The ABB HVAC Drive is a temperature controls engineer's dream… on-board passthrough I/O, a free PID loop controller, and broken belt indication. Damper end-switch and smoke purge controls are built-in at no additional charge!"**

Interactive maintenance assistant
Maintenance scheduling no longer requires guesswork. The HVAC drive alerts you when maintenance is required based on your individual requirements.

Fault logger
The fault logger of the HVAC drive is especially useful in tracking down drive trips through its use of the real-time clock.
In addition to recording both time and date, the fault logger also takes a snapshot of 7 diagnostic values - like motor speed and output current. You know what happened and when.

Two PID controllers as standard
The HVAC drive has two independent PID controllers built in. As an example: one PID controller works with the AFD to maintain the duct static pressure; simultaneously, the other PID controller can be used to control a separate external device, e.g. a chilled water valve. All of this can, of course, be monitored and controlled through serial communications.

– Built-in!

Interactive diagnostic assistant
Should a fault occur, the diagnostic assistant displays, in plain language, possible causes and potential solutions.

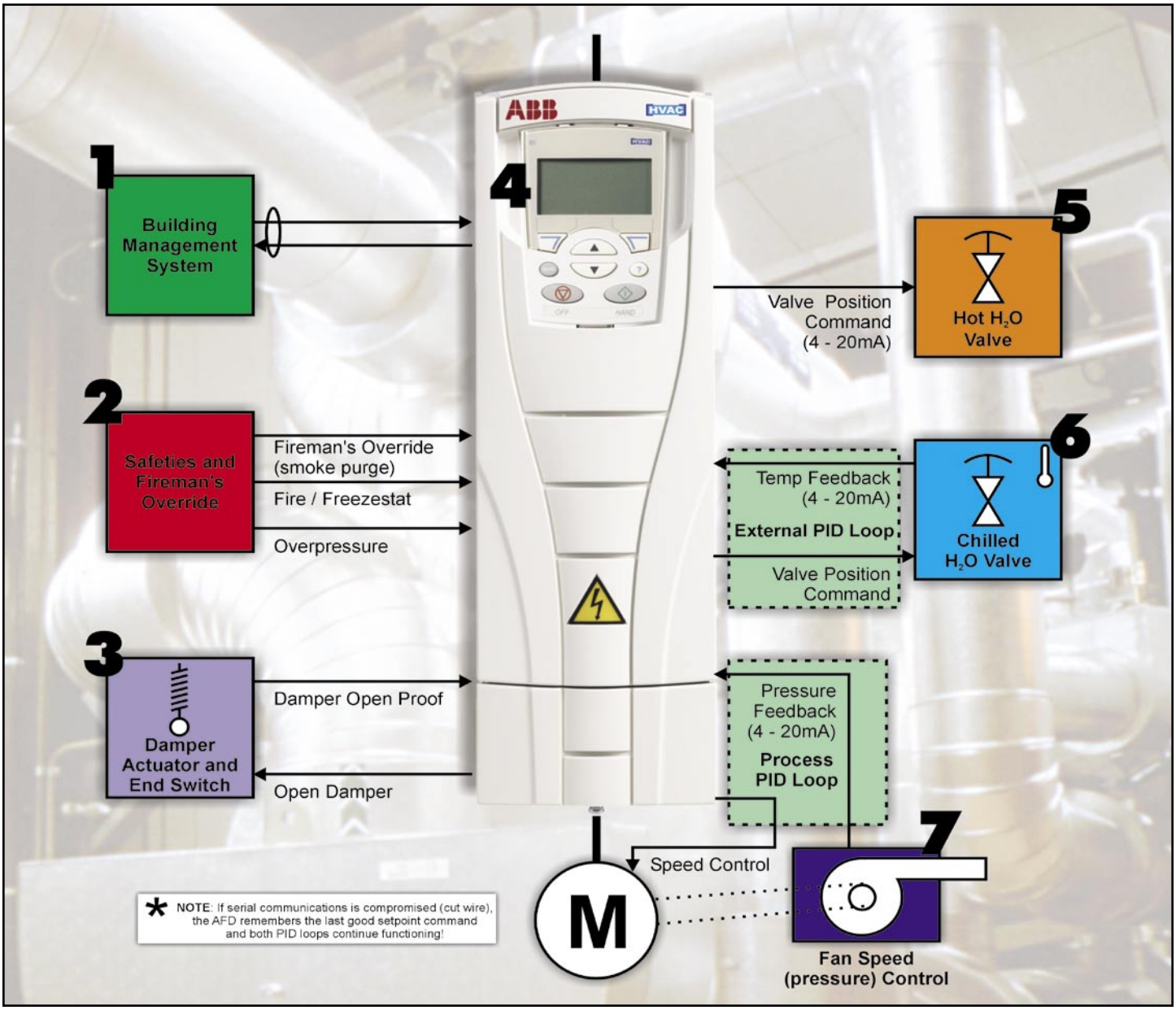
Flux optimization
This standard feature means the drive supplies only the voltage and current necessary to drive the load. This results in reduced energy consumption and much lower motor noise levels. Silent operation mode further reduces motor audible noise for sensitive applications.

Versatile software tools
DriveWindow Light 2 further facilitates commissioning and maintenance. Pump & Fan Save helps calculate energy savings and pay-back times. ABB's Harmonics Calculator allows the engineer to run harmonics contribution estimates.

Specifying Engineers State...

- **"The 5% swinging choke means I do not need to oversize my supply transformer and cables to meet NEC 430-2."**
- **"Specifying a drive that meets EMC product standards for the First Environment means I will not have job site EMI / RFI issues or complaints."**
- **"A keypad that functions like a cell phone – what could be easier?"**
- **"The built-in communications suite means I can have intelligent drive applications regardless of which temperature control contactor is successful on the project"**
- **"When I call ABB, I know I get the right answer."**
- **"ABB supplies submittal packages that provide the detailed information and drawings I need to verify quickly that the ABB drive meets my specification requirements. That information saves me a lot of time."**

Unitary Controller - Built-In



1) The BMS commands start/stop; internal/external PID setpoints; command digital (relay) outputs, and analog (4-20mA) outputs and reset faults. The BMS reads drive outputs; controlled variable feedback; Hand/Auto selected indication; kWhrs (R); Operating hrs (R); drive amps (broken belt indication); drive temperature; all warnings, faults, and much more.

2) Receive and monitor hard-wired devices -- firestat/ freezestat safety contacts, smoke purge commands -- over the serial link.

3) Open an isolation damper, override a VAV box or any device that requires a maintained contact closure for control. Receive damper end-switch proof contact.

4) The Keypad Display indicates feedback and setpoint in inches of water column - or programmable units intuitive to the user.

5) BMS commands a drive analog output to control hot water valves or any device requiring a 4-20mA analog input.

6) The drive's external PID Loop Controller controls a chilled water valve or any device requiring a 0-20mA input. Feedback signal is hard-wired to AFD and setpoint is sent via serial comms.

7) Use the drive's process PID Loop Controller to maintain supply fan pressure via adjusting fan speed. Pressure feedback is hard-wired to AFD and setpoint is sent via serial comms.

Keypad & Firmware Features

The new ABB ACH Series Drive Keypad takes the typical operator interface to a new level.

ABB ACH Series Drive Keypads use full language, no codes. And this keypad emulates the human interface of a cell phone. Easy as a mobile phone, and you control a panel with intuitive handling in 14 languages.

The new ABB ACH Series Drive has pioneered several new-to-the-market features such as Maintenance Assistants, Diagnostic Assistants, Programming Assistants, and Help Screens.

For example, if there's a trip off line, pressing the Help Key brings the user to the Diagnostic Assistant; it suggests possible causes of the trip and probable corrective actions.

Programming Assistants configure the drive for an application. For example, the PID Assistant prompts the user through a series of 12 questions; and uses the answers to these questions to set 26 parameters inside of the drive's program. No need to navigate the drive menus!

The Maintenance Assistant alerts users when equipment maintenance is required, based on selected inputs. Utilize the Revolution Counter and Maintenance Assistant to signal personnel when it's time to replace the pump packing.

The Keypad features two soft keys; their functions change according to the operating state of the panel. Hand-Off-Auto buttons provide local control for local-speed and start/stop control.

The Help Button brings up a description of what the effect of parameter changes would be – in full sentences!

Faults can be time and date stamped via the real-time clock. A fault logger stores status information such as amps, volts and presence of a run command at the time of the fault.

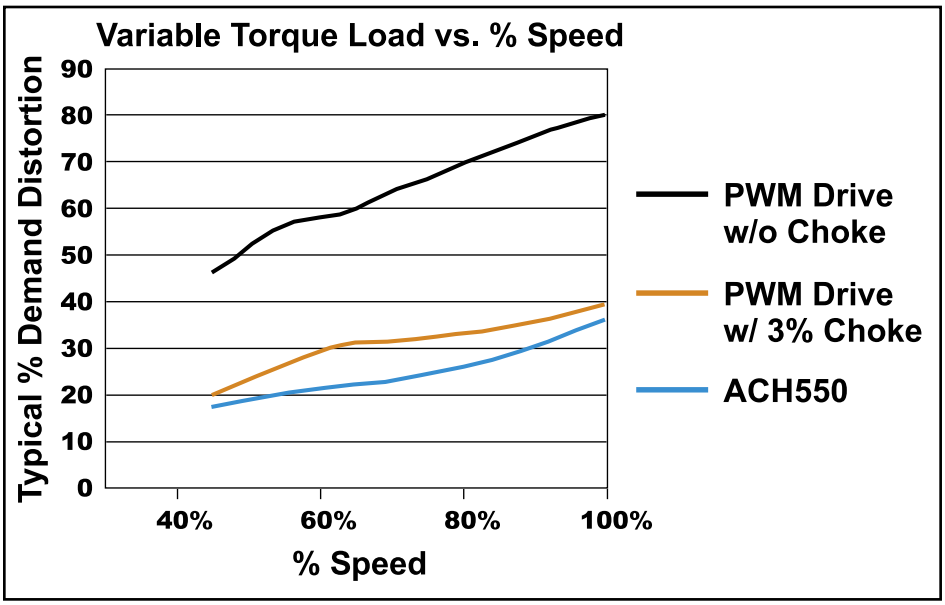
Patent-Pending Swinging Choke (Reactor) Reduces Harmonics

ABB ACH Series Drives include a 5% swinging choke. Filter chokes fall into two categories: the Linear Chokes and the Swinging Choke. A Linear Choke has an inductance that is relatively constant up to the rated value of current. These chokes are designed so that they will not saturate when carrying all of the load current.

The Swinging Choke is used in applications where the change in inductance is inversely proportional to the change in load current (such as variable torque applications). A well designed swinging choke provides the proper inductance to ensure adequate filtering and the continuous flow of current through the rectifier for all levels of load current.

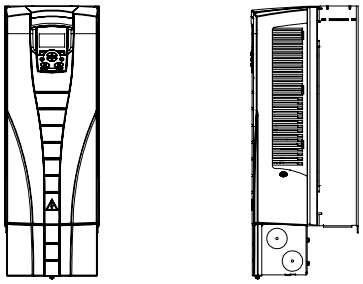
From the graph (at right), it can be seen that the built-in swinging choke in all ABB HVAC Drives allows the drive to deliver over 25% less harmonics at partial loads than a conventional 3% reactor; more than 60% less harmonics than a drive with no reactor!

The reduced harmonics means the drive input current is the same as the output current. No need to oversize branch circuit wiring to comply with NEC 430-2!

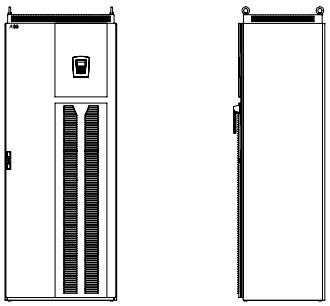


55% less harmonics at full load, better than 64% less harmonics at partial loads. (HVAC Drives spend most of their operating hours at partial loads.)

Dimensions and Ratings Tables



Wall Mount (R1 - R6)



Floor Mount (R7 - R8)

Frame Size	Dimensions mm [inches]		
	Height (H)	Width (W)	Depth (D)
R1	369 [14.5]	125 [4.9]	212 [8.3]
R2	469 [18.5]	125 [4.9]	222 [8.7]
R3	583 [23.0]	203 [8.0]	231 [9.1]
R4	689 [27.1]	203 [8.0]	262 [10.3]
R5	736 [29.0]	265 [10.4]	286 [11.3]
R6	880 [34.6]	300 [11.8]	400 [15.8]
R7	2065 [81.3]	806 [31.7]	659 [25.9]
R8	2065 [81.3]	806 [31.7]	659 [25.9]

	HP	Type Code	Amps	Frame Size
208/240 V	1	ACH550-UH-04A6-2	4.6	R1
	1.5	ACH550-UH-06A6-2	6.6	R1
	2	ACH550-UH-07A5-2	7.5	R1
	3	ACH550-UH-012A-2	11.8	R1
	5	ACH550-UH-017A-2	16.7	R1
	7.5	ACH550-UH-024A-2	24.2	R2
	10	ACH550-UH-031A-2	30.8	R2
	15	ACH550-UH-046A-2	46.2	R3
	20	ACH550-UH-059A-2	59.4	R3
	25	ACH550-UH-075A-2	74.8	R4
	30	ACH550-UH-088A-2	88	R4
	40	ACH550-UH-114A-2	114	R4
	50	ACH550-UH-143A-2	143	R6
	60	ACH550-UH-178A-2	178	R6
	75	ACH550-UH-221A-2	221	R6
380/480 V	1	ACH550-UH-03A3-4	3.3	R1
	1.5	ACH550-UH-03A3-4	3.3	R1
	2	ACH550-UH-04A1-4	4.1	R1
	3	ACH550-UH-06A9-4	6.9	R1
	5	ACH550-UH-08A8-4	8.8	R1
	7.5	ACH550-UH-012A-4	11.9	R1
	10	ACH550-UH-015A-4	15.4	R2
	15	ACH550-UH-023A-4	23	R2
	20	ACH550-UH-031A-4	31	R3
	25	ACH550-UH-038A-4	38	R3
	30	ACH550-UH-044A-4	44	R4
	40	ACH550-UH-059A-4	59	R4
	50	ACH550-UH-072A-4	72	R4
	60	ACH550-UH-077A-4	77	R5
	75	ACH550-UH-096A-4	96	R5
	100	ACH550-UH-124A-4	124	R6
	125	ACH550-UH-157A-4	157	R6
	150	ACH550-UH-180A-4	180	R6
	200	ACH550-UH-245A-4	245	R7
	250	ACH550-UH-316A-4	316	R8
	300	ACH550-UH-368A-4	368	R8
	350	ACH550-UH-414A-4	414	R8
	400	ACH550-UH-486A-4	486	R8
	450	ACH550-UH-526A-4	526	R8
	500	ACH550-UH-602A-4	602	R8
	550	ACH550-UH-645A-4	645	R8

ABB Inc.
Low Voltage Drives
16250 W. Glendale Drive
New Berlin, WI 53151
Telephone (800) 752-0696
Fax (262) 785-0397
Internet http://www.abb-drives.com

ACH550-US-01 Rev. A Effective: 6/15/04 Specifications subject to change without notice.
The Industrial^{IT} wordmark and all above-mentioned product names in the form Drive^{IT} are registered or pending trademarks of ABB.