

# ABB standard drives for HVAC applications

ACH550, 0.75 to 355 kW

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ABB  
OK!  
ACH550

IEC  
EN

61000-3-12



## Ready-to-play AC drive for HVAC

Every so often a product comes along that surpasses everyone's expectations. The ABB HVAC drive is such a product. As the first AC drive dedicated to the HVAC sector, over 100,000 have now been reliably installed in every continent of the world. And with no product failures or delivery issues, the ABB HVAC drive has become recognized as a world beater, winning awards in Italy and the USA for its outstanding engineering.

Maybe it is the simple user interface? Designed with the simplicity and intuitiveness of a mobile phone. Start-up of the drive could not be easier. Or it could be the built-in macros, as standard, for the most common applications. Selecting the application takes only seconds.

The drive is programmed with several HVAC applications, including supply and return fans, cooling tower fans, booster pumps and condensers. The intelligence within the HVAC control panel means that the user is given direct and understandable instructions in clear text at all times.

Harmonics and RFI emissions are major concerns within many HVAC installations. The ABB HVAC drive fulfils demanding requirements for electromagnetic compatibility. A swinging choke cuts harmonics emissions by up to 25%.

## A clean standard against dirty electricity - IEC/EN 61000-3-12

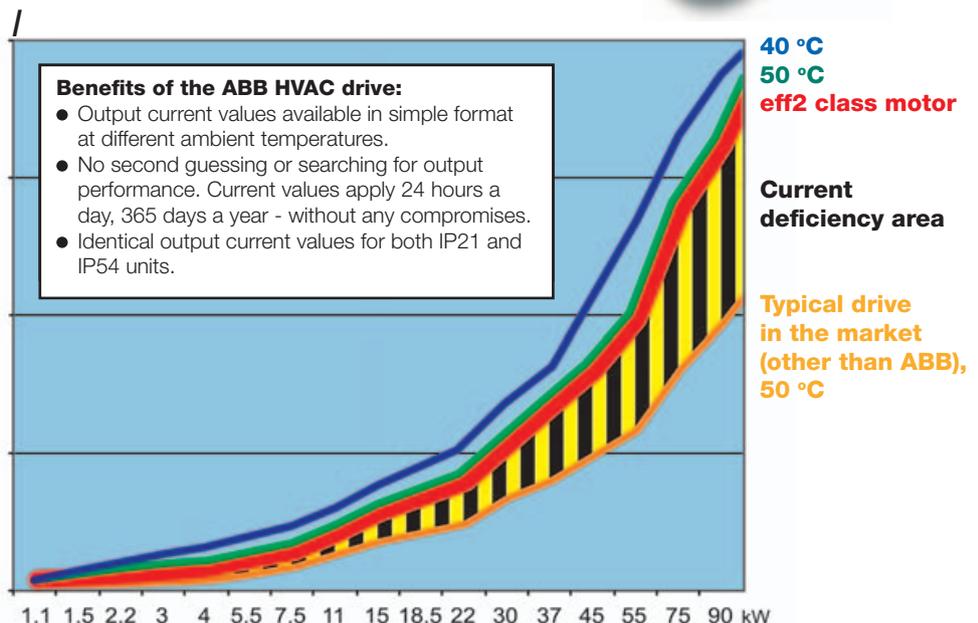
The ABB HVAC drive fulfils IEC/EN 61000-3-12. This European standard sets strict limits for harmonic currents produced by products connected to the electrical network.

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.

The new European standard IEC/EN 61000-3-12 has been approved and can be used. The ABB HVAC drive meets the requirements of the standard and carries manufacturer's written statement of compliance. This means security and simplicity for specifying engineers and facility managers. After a transition period the standard will become mandatory to all equipment installed after February 2008 which means that designers must consider it today.

## Ambient temperature up to 50 °C in 24/7/365!

Ambient temperatures affect the output performance of each drive. The hotter it is outside - or inside the cabinet in which the drive is installed - the less current the drive can deliver. This means that the designer has to select the drive according to the peak temperature.



The figure shows output currents of the ABB HVAC drive at ambient temperatures of 40 °C and 50 °C. The thick red curve illustrates the required nominal motor current of ABB M2000 range eff2 motors, while the orange curve shows the output current of a typical drive (other than ABB) in the market.



# Peace of mind



"We specify ABB drives and have them running in more than 3,000 buildings. Their simplicity and reliability allow me to concentrate on my job without having to worry about the HVAC installation."



"When I call ABB, I know I get the right answer."



"With ABB's energy saving tools, I can prove that the money saved helps justify the investment. Some people like the general idea of saving energy, some people want to go into the smallest detail. Either is possible with ABB's HVAC drive."



"I don't have to look for external components like timers and PID controllers and then worry about their compatibility."



"The ABB HVAC drive does precisely what it is engineered to do - when the building gets hot the drive delivers air flow to suit."



"ABB HVAC drive documentation is simple and clear to understand. For the first time in a long while I never get calls from our personnel on site."



"Once the ABB HVAC drive is installed, that's the last time I hear about it."



"Override is an invaluable function that minimizes the number of components and facilitates my job."

## Keeps you out of trouble

- EMC filters for building sector, class C2 (1<sup>st</sup> environment).
  - Meets mandatory harmonic current standard EN 61000-3-12.
  - Coated electronic boards supporting longer lifetime of the drive.
  - Full motor (kW) output at 50 °C
- All items carry written manufacturer's statement of conformity.

## Real-time clock and calendar

The inbuilt real-time clock and calendar function provides true time and date stamps to drive events. Information is displayed clearly on the control panel. The clock and calendar function enables the use of timers. Further, daylight saving times are easily selected according to different time zones.

## Inbuilt timers

External timer circuits are no longer needed. Inbuilt 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.

**Ambient temperature up to 50 °C  
in 24/7/365.**

## BACnet, 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 supplied, to building automation, tens of thousands of drives utilizing serial communications, including more than 5,000 BACnet installations.



**IP21**

# - as standard!

## Makes your life comfortable

- Multilingual control panel with HELP-button
- 14 HVAC application macros are pre-programmed and selectable without programming.
- A printed user's manual is delivered with each drive.
- Miniature circuit breakers can be used instead of fuses.

## Swinging chokes - up to 25% less harmonics

ABB's swinging choke lets the ABB HVAC drive deliver up to 25% less harmonics at partial loads, compared to a conventional choke of equal size.

## Wide range of interactive assistants

- Start-up
  - PID
  - Timer functions
  - Serial communication
- And many more...

## Interactive start-up assistant

The start-up assistant shows how to use the PID controllers, timers and serial communications settings.

## Tailor-made HVAC software

The ABB HVAC drive delivers a complete solution with a tailor-made configuration that will save you time and money. For example, actual process values like differential pressure signals can be converted inside the HVAC drive and displayed in engineering units like bar, l/s and °C.



IP54



"A great feature is the start-up assistant. It guides me through the start-up routine of the drive, very quickly and easily, enabling me to put a less experienced person on the job."



"The ABB HVAC drive speaks my language - even in full sentences! I save time and money."



"Thanks to smart design, control and power cables are extremely easy to connect."



"The ABB HVAC drive has all the functionality I need, inbuilt. So I don't have to check for the order handling to see if all add-ons have been included. One less thing to worry about."



"With the timer function I can leave out Building Management System (BMS) automation completely on smaller jobs."



"ABB's no-quibble warranty means just that - no questions are asked, so paperwork is kept to a minimum."



# Peace of mind

 “With the swinging choke taking care of harmonics, I only pay for the electricity that works for me and not for the electricity that just causes losses.”

 “The energy saving capability of the ABB HVAC drive means it pays back in less than two years. After that the drive provides profit straight to my bottom line.”

 “My system delivers the output I require, when I need it, and especially when it is hot outside.”

 “Reaction to load change is fast and I only pay for the peak capacity when it is needed.”

 “I love the HELP button. I call it my panic button - it is always there to guide me.”

 “The ABB HVAC drive’s silence is music to my ears!”

 “Tripless operation is a great feature - for me it means no trips by my maintenance personnel.”

 “In case of an alarm or fault situation, the diagnostic assistant automatically tells me in clear language what to do.”

 “With inbuilt and snap-on fieldbusses I’m flexible for all future automation needs.”

 “The maintenance assistant is another great feature of the ABB HVAC drive. I simply do not have to worry about when to service the equipment. The drive tells me when it is time to send people to do maintenance.”

 “ABB will be here in 10 years time and beyond. That is the biggest guarantee you can give me.”

## Interactive maintenance assistant

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

## Interactive diagnostic assistant

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

## Fault logger

The fault logger of the ABB HVAC drive is especially useful in tracking down drive failures 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.

## PC tools for

- calculating energy savings and pay-back times
- commissioning (DriveWindow Light 2)

## Noise smoothing

Clever software function to smooth the audible noise.



## Tailor-made control panel for HVAC applications

- Interactive assistants advise on the use of PID (incl. air flow calculation), timers, fieldbus and facilitate commissioning
- HELP button always available
- Up- and downloading of parameters from one HVAC drive to another
- Easily detachable by hand (both IP21 and IP54)
- Inbuilt real-time clock
- 16 languages available in one single panel, including Russian, Turkish, Czech and Polish



# - as standard!

## Flange mounting

The ABB HVAC drive can be flange-mounted to the side of an air duct or integrated with an air handling unit (AHU). By placing the heat sink of the ABB HVAC drive in the air flow, additional cooling is achieved efficiently.

## Flux optimization

With flux optimization, the magnitude of the flux varies depending on the actual load. This results in reduced energy consumption and lower noise levels. Silent operation functions further reduce noise in domestic applications.

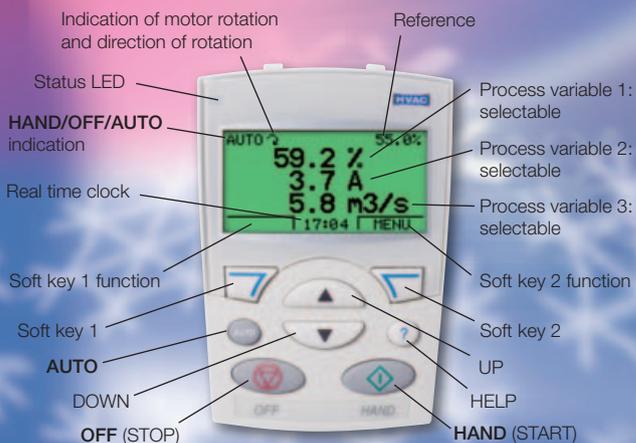
## Two PID controllers as standard

The ABB HVAC drive has two independent PID controllers built in. As an example: one PID controller works with the HVAC drive 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.

## Mounting side by side

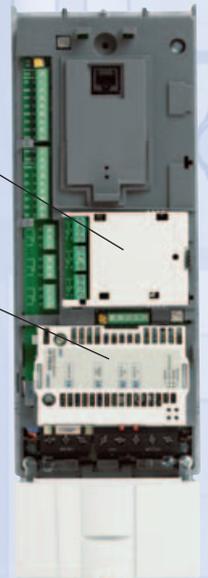
The ABB HVAC drive is optimized for building into cabinets: no space is needed between the units, whether IP21 or IP54, even with the covers on.

## Motor protection with PTC or PT 100.



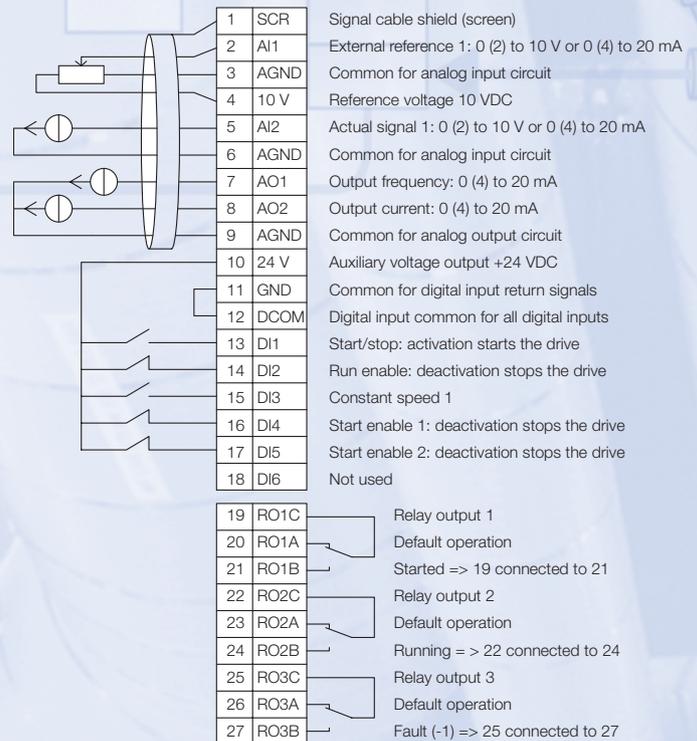
## Snap-on options

- Relay extension module for three additional outputs (module fits under the cover of the ABB HVAC drive).
- Fieldbus adapter modules (fit under the cover of the ABB HVAC drive) for LonWorks (LonMark approved), PROFIBUS, DeviceNet, etc.
- Control panel mounting kit for cabinet door mounting.
- Output filters, please contact ABB.



## Inputs and outputs

The diagram below shows the inputs and outputs of the ABB HVAC drive. The sample connections are suitable for a number of HVAC applications like supply and return fans, condensers and booster pumps.



- All inputs and outputs are short-circuit protected.
- All connectors are individually numbered, reducing possible causes of misunderstandings and errors.

# Technical data and types



## Technical specification

Mains connection	
<b>Voltage and power range</b>	3-phase, 380 to 480 V, +10/-15% (0.75 to 355 kW) 3-phase, 208 to 240 V, +10/-15% (0.75 to 75 kW) 1-phase, 208 to 240 V, +10/-15% (50% derating) auto-identification of input line
<b>Frequency</b>	48 to 63 Hz
<b>Power factor</b>	0.98
Motor connection	
<b>Voltage</b>	3-phase, from 0 to $U_N$
<b>Frequency</b>	0 to 500 Hz
<b>Rated currents (apply to both IP21 and IP54)</b>	
Current at ambient temperature of -15 to +40 °C: rated output current ( $I_{2N}$ ), no derating needed	
Current at ambient temperature of +40 to +50 °C: derating of 1%/°C above 40 °C, max. derating 10%	
<b>Switching frequency</b>	selectable 0.75 to 37 kW: 1 kHz, 4 kHz, 8 kHz or 12 kHz 45 to 110 kW: 1 kHz, 4 kHz or 8 kHz 132 to 355 kW 1 kHz or 4 kHz
Environmental limits	
<b>Ambient temperature</b>	
Transportation and storage	-40 to 70 °C
Operation	-15 to 50 °C (no frost allowed)
<b>Altitude</b>	
Output current	rated current available at 0 to 1000 m reduced by 1% per 100 m over 1000 to 2000 m
Relative humidity	lower than 95% (without condensation)
<b>Protection classes</b>	
	IP21 or IP54 IP21 for wall mounted and free standing units IP54 for wall mounted units
Inputs and outputs	
<b>2 analog inputs</b>	
Voltage signal	selectable both for current and voltage 0 (2) to 10 V, $R_{in} > 312 \text{ k}\Omega$ single-ended
Current signal	0 (4) to 20 mA, $R_{in} = 100 \Omega$ single-ended
Potentiometer reference value	10 V $\pm 2\%$ max. 10 mA, $R < 10 \text{ k}\Omega$
<b>2 analog outputs</b>	
Internal auxiliary voltage	0 (4) to 20 mA, load $< 500 \Omega$ 24 V DC $\pm 10\%$ , max. 250 mA
<b>6 digital inputs</b>	
	12 to 24 V DC with internal or external supply
<b>3 relay outputs</b>	
	Maximum switching voltage 250 V AC / 30 V DC Maximum continuous current 2 A rms
<b>PTC and PT 100</b>	
	Any of the 6 digital inputs or analog inputs can be configured for PTC. Both analog outputs can be used to feed the PT 100 sensor.
<b>Fieldbuses</b>	
	Inbuilt as standard (RS 485) BACnet, Modbus, N2 and FLN Available as plug-in options LonWorks, PROFIBUS, DeviceNet etc.
Protection functions	
	Overvoltage controller Undervoltage controller Earth-leakage supervision Motor short-circuit protection Output and input switch supervision Overcurrent protection Phase-loss detection (both motor & line) Underload supervision - can be used also for belt-loss detection Overload supervision Stall protection
Product compliance	
<b>Harmonics</b>	IEC/EN 61000-3-12
	Low Voltage Directive 73/23/EEC with supplements Machinery Directive 98/37/EC EMC Directive 89/336/EEC with supplements Quality assurance system ISO 9001 and Environmental system ISO 14001 CE, UL, cUL, and GOST R approvals Galvanic isolation according to PELV RoHS (Restriction of Hazardous Substances)
<b>EMC (according to EN61800-3)</b>	Class C2 (1 <sup>st</sup> environment restricted distribution) as standard

## Ratings, types and voltages

$P_N$ kW	$I_{2N}$ A	Frame size	Type code (order code)
$U_N = 380$ to $480 \text{ V}$ (380, 400, 415, 440, 460, 480 V) HVAC control panel and EMC filter are included.			
0.75	2.4	R1	ACH550-01-02A4-4
1.1	3.3	R1	ACH550-01-03A3-4
1.5	4.1	R1	ACH550-01-04A1-4
2.2	5.4	R1	ACH550-01-05A4-4
3	6.9	R1	ACH550-01-06A9-4
4	8.8	R1	ACH550-01-08A8-4
5.5	11.9	R1	ACH550-01-012A-4
7.5	15.4	R2	ACH550-01-015A-4
11	23	R2	ACH550-01-023A-4
15	31	R3	ACH550-01-031A-4
18.5	38	R3	ACH550-01-038A-4
22	45	R3	ACH550-01-045A-4
30	59	R4	ACH550-01-059A-4
37	72	R4	ACH550-01-072A-4
45	87	R4	ACH550-01-087A-4
55	125	R5	ACH550-01-125A-4
75	157	R6	ACH550-01-157A-4
90	180	R6	ACH550-01-180A-4
110	205	R6	ACH550-01-195A-4
132	246	R6	ACH550-01-246A-4
160	289	R7	ACH550-02-289A-4
200	368	R8	ACH550-02-368A-4
250	486	R8	ACH550-02-486A-4
280	526	R8	ACH550-02-526A-4
315	602	R8	ACH550-02-602A-4
355	645	R8	ACH550-02-645A-4

$I_{2N}$  = nominal output current.  
The ABB HVAC drive can deliver  $P_N$  continuously at an ambient temperature of 50 °C. In addition, 1,1  $\times I_{2N}$  overload is allowed for 1 minute every 10 minutes through the entire speed range.  
 $P_N$  = typical motor power  
 $U_N$  = nominal supply voltage

## Dimensions and weights

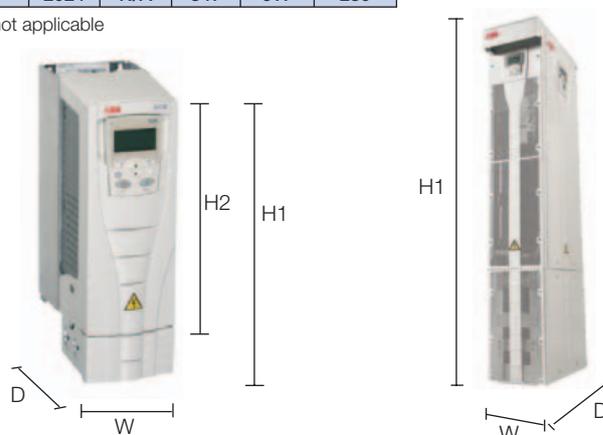
### Wall mounted units

Frame size	Dimensions and weights								
	IP21 / UL type 1					IP54 / UL type 12			
	H1 mm	H2 mm	W mm	D mm	Weight kg	H mm	W mm	D mm	Weight kg
R1	369	330	125	212	6.5	449	213	234	8.2
R2	469	430	125	222	9	549	213	245	11.2
R3	583	490	203	231	16	611	257	253	18.5
R4	689	596	203	262	24	742	257	284	26.5
R5	739	602	265	286	34	776	369	309	38.5
R6	880	700	300	400	69	924	410	423	80

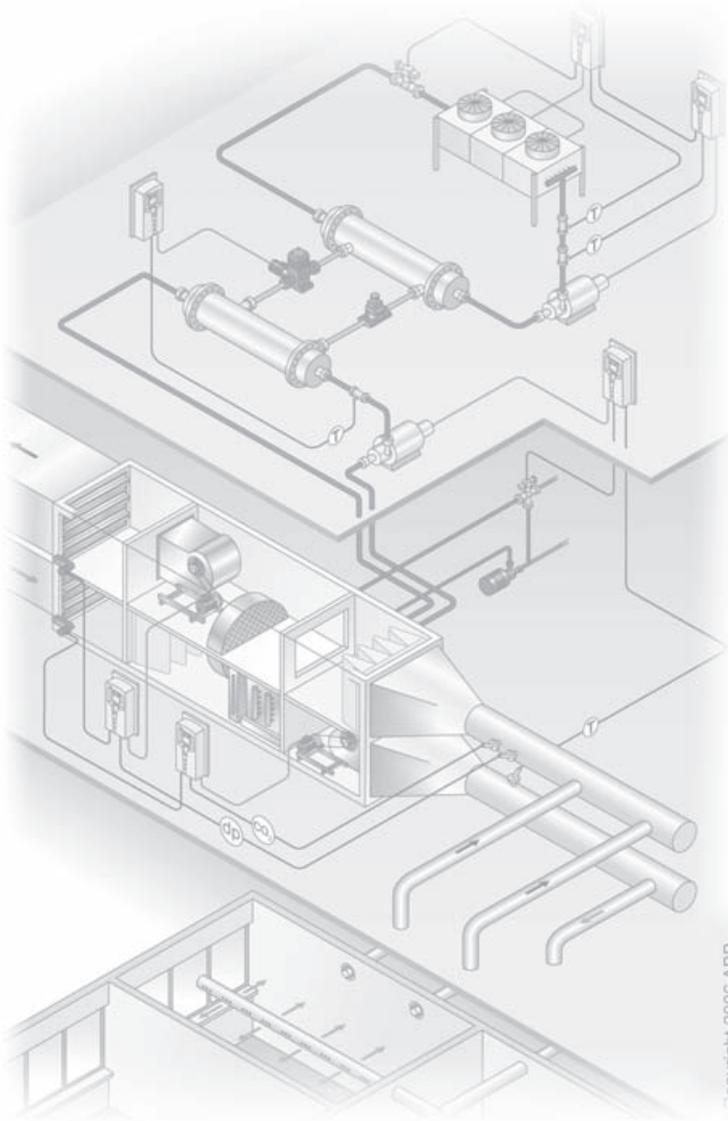
### Free standing units

R7	1507	N/A	250	520	115
R8	2024	N/A	347	617	230

N/A = not applicable



H1 = Height with cable connection box  
H2 = Height without cable connection box  
W = Width  
D = Depth



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