

# ABB standard drives for HVAC applications

## ACH550, 0.75 to 355 kW

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**ABB OK!**  
MEC EN  
61000-3-12  
ACH550

## Ready-to-play AC drive for HVAC

Every so often a product comes along that surpasses everyone's expectations. The ABB standard drive for HVAC is such a product. As the first AC drive dedicated to the HVAC sector, over 300,000 have now been reliably installed in every continent of the world. And with no product failures or delivery issues, the ABB standard drive for HVAC 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 inbuilt 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 standard drive for HVAC fulfils demanding requirements for electromagnetic compatibility. A swinging choke cuts harmonics emissions by up to 25 percent.

## Smaller carbon footprint through improved energy efficiency

One of the biggest benefits of using ABB standard drives for HVAC applications is the energy saving opportunity over other control methods that are used in combination with motors running at fixed speed. 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.

In HVAC applications, the most of which are pumps and fans, AC drives can cut energy bills typically from 20 to 50 percent, although higher savings are possible. As such ABB is a world leader in assessing the energy saving potential within the HVAC sector.

ABB offers energy audits, coupled with a series of energy saving tools and

calculators inbuilt in drives. Energy audits can rapidly determine just 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 standard drives for HVAC offer a return on investment usually within months on the basis of energy savings alone.

For over 30 years, ABB has delivered millions of AC drives worldwide. In 2008 the installed base contributed to some 170 TWh (170 000 000 000 kWh) reduction in electricity consumption. Had this consumption been generated with fossil fuel powered electricity plants, then some 140 million tonnes of CO<sub>2</sub> would have been produced. This is equivalent to the annual CO<sub>2</sub> emissions of over 35 million cars.

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

The ABB standard drive for HVAC fulfils IEC/EN 61000-3-12 and carries 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.

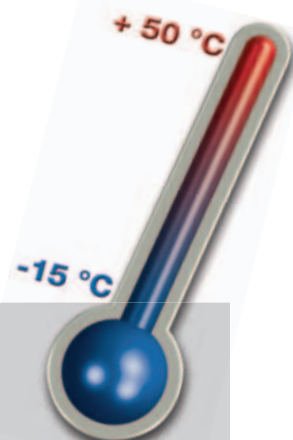


## Ambient temperature up to 50 °C in 24/7/365!

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.

### Benefits of the ABB standard drive for HVAC:

- Output current values available in simple format at different ambient temperatures
- Identical output current values for both IP21 and IP54 units







Design engineer

# 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 the ABB standard drive for HVAC."



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



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



"The documentation for the ABB standard drive for HVAC 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 standard drive for HVAC 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**



IP21

## BACnet MS/TP, N2, FLN and Modbus embedded

Commonly used HVAC communication protocols are embedded into 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 20,000 BACnet installations.



# - 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 standard drive for HVAC 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...

## Main switch as option for local safety

Integrated drive specific disconnect solution for

- easy installation
- easy serviceability
- space savings

## 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 standard drive for HVAC 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 drive and displayed in engineering units like bar, l/s and °C.



"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 standard drive for HVAC 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 standard drive for HVAC 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."



IP54



Contractor





"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 standard drive for HVAC means it pays back in less than two years. After that the drive provides profit straight to my bottom line. Using ABB's remote access and diagnostics tools gives me real-time proof on the energy savings"



"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 silence of the ABB standard drive for HVAC 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 standard drive for HVAC. 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."



Facility manager

# Peace of mind

## Interactive maintenance assistant

Maintenance scheduling no longer requires guesswork. The ABB standard drive for HVAC 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 standard drive for HVAC 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.

## Tools for

- calculating energy savings and payback times
- commissioning
- remote access and diagnostics

## 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 drive to another
- Easily detachable by hand (both IP21 and IP54)
- Inbuilt real-time clock
- 17 languages available in one single panel, including Russian, Turkish, Czech, Polish and Chinese

# - as standard!

## Flange mounting

The ABB standard drive for HVAC 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 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.

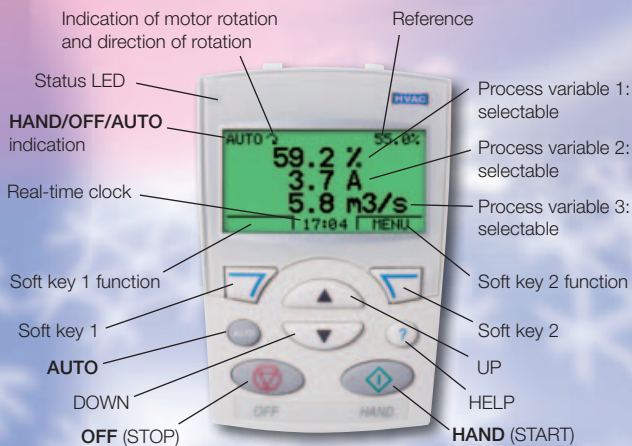
## Two PID controllers as standard

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

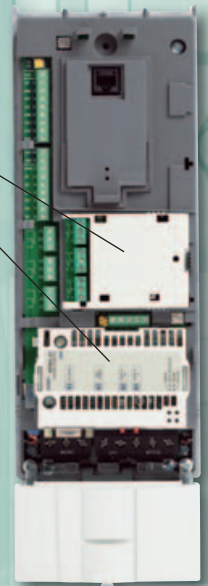
The ABB standard drive for HVAC is optimized for building into cabinets: no space is needed between the units, whether IP21 or IP54, even with the covers on.

## Motor protection with PTC or PT 100



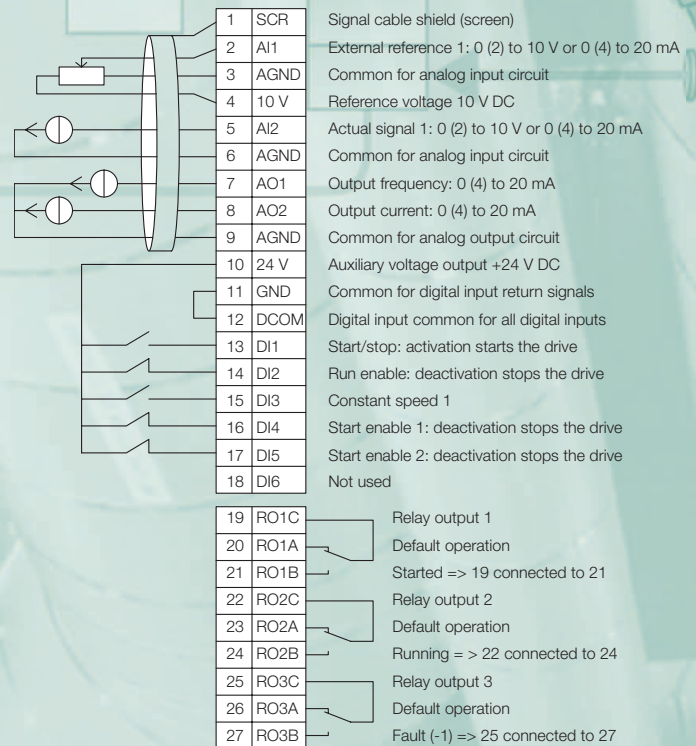
## Options

- Relay extension module for three additional outputs (module fits under the cover of the drive).
- BACnet/IP router, LonWorks adapter (LonMark approved) or other option module. Modules fit under the cover of the drive.
- Control panel mounting kit for cabinet door mounting.
- Output filters, please contact ABB.
- External module for remote access and diagnostics.



## Inputs and outputs

The diagram below shows the inputs and outputs of the ABB standard drive for HVAC. 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	
Voltage and power range	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
Frequency	48 to 63 Hz
Power factor	0.98
Efficiency at rated power	
98%	
Motor connection	
Voltage	3-phase, from 0 to $U_N$
Frequency	0 to 500 Hz
Rated currents (apply to both IP21 and IP54)	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 less than 1%/ °C above 40 °C
Switching frequency	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	
Ambient temperature Transportation and storage Operation	-40 to 70 °C -15 to 50 °C (no frost allowed)
Altitude Output current	rated current available at 0 to 1000 m, reduced by 1% per 100 m over 1000 to 2000 m, 2000 to 4000 m, please consult ABB
Relative humidity	lower than 95% (without condensation)
Protection classes	IP21 or IP54 IP21 for wall mounted and free standing units IP54 for wall mounted units
Inputs and outputs	
2 analog inputs Voltage signal Current signal Potentiometer reference value	selectable both for current and voltage 0 (2) to 10 V, $R_i > 312 \text{ k}\Omega$ single-ended 0 (4) to 20 mA, $R_i = 100 \Omega$ single-ended 10 V $\pm 2\%$ max. 10 mA, $R < 10 \text{ k}\Omega$
2 analog outputs Internal auxiliary voltage	0 (4) to 20 mA, load $< 500 \Omega$ 24 V DC $\pm 10\%$ , max. 250 mA
6 digital inputs	12 to 24 V DC with internal or external supply
3 relay outputs	Maximum switching voltage 250 V AC / 30 V DC Maximum continuous current 2 A rms
PTC and PT 100	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.
Communication	Protocols as standard (RS 485): BACnet MS/TP, Modbus RTU, N2 and FLN Available as plug-in options: BACnet/IP router, LonWorks, Ethernet etc. Available as an external option: remote access and diagnostics module
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 and line) Underload supervision - can be used also for belt-loss detection Overload supervision Stall protection	
Product compliance	
Harmonics	IEC/EN 61000-3-12
Standards and directives	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)
EMC (according to EN61800-3)	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)
$U_N = 380 \text{ to } 480 \text{ V}$ (380, 400, 415, 440, 460, 480 V) HVAC control panel and EMC filter are included.			
0.75	2.4	R1	ACH550-01-02A4-4 <sup>1)</sup>
1.1	3.3	R1	ACH550-01-03A3-4 <sup>1)</sup>
1.5	4.1	R1	ACH550-01-04A1-4 <sup>1)</sup>
2.2	5.4	R1	ACH550-01-05A4-4 <sup>1)</sup>
3	6.9	R1	ACH550-01-06A9-4 <sup>1)</sup>
4	8.8	R1	ACH550-01-08A8-4 <sup>1)</sup>
5.5	11.9	R1	ACH550-01-012A-4 <sup>1)</sup>
7.5	15.4	R2	ACH550-01-015A-4 <sup>1)</sup>
11	23	R2	ACH550-01-023A-4 <sup>1)</sup>
15	31	R3	ACH550-01-031A-4 <sup>1)</sup>
18.5	38	R3	ACH550-01-038A-4 <sup>1)</sup>
22	45	R3	ACH550-01-045A-4 <sup>1)</sup>
30	59	R4	ACH550-01-059A-4 <sup>1)</sup>
37	72	R4	ACH550-01-072A-4 <sup>1)</sup>
45	87	R4	ACH550-01-087A-4 <sup>1)</sup>
55	125	R5	ACH550-01-125A-4 <sup>1)</sup>
75	157	R6	ACH550-01-157A-4 <sup>1)</sup>
90	180	R6	ACH550-01-180A-4 <sup>1)</sup>
110	205	R6	ACH550-01-195A-4 <sup>1)</sup>
132	246	R6*	ACH550-01-246A-4 <sup>1)</sup>
160	290	R6*	ACH550-01-290A-4 <sup>1)</sup>
200	368	R8	ACH550-02-368A-4 <sup>1)</sup>
250	486	R8	ACH550-02-486A-4 <sup>1)</sup>
280	526	R8	ACH550-02-526A-4 <sup>1)</sup>
315	602	R8	ACH550-02-602A-4 <sup>1)</sup>
355	645	R8	ACH550-02-645A-4 <sup>1)</sup>

<sup>1)</sup> This type code is valid for the IP21 unit. For the IP54 unit, add +B055 at the end of the code.

$I_{2N}$  = nominal output current  
1,1 x  $I_{2N}$  overload is allowed  
for 1 minute every 10 minutes  
through the entire speed  
range.

$P_N$  = typical motor power  
The ABB standard drive  
for HVAC can deliver  $P_N$   
continuously at an ambient  
temperature of 50 °C.  
 $U_N$  = nominal supply voltage

## Dimensions and weights

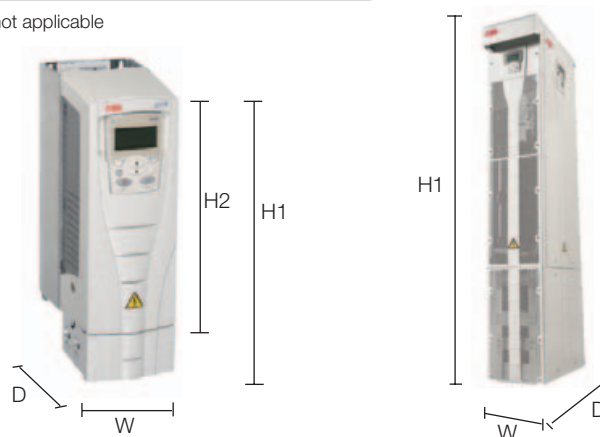
### Wall mounted units

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	302	400	69	924	410	423	80
R6*	986	700	302	400	73	1119	410	423	84

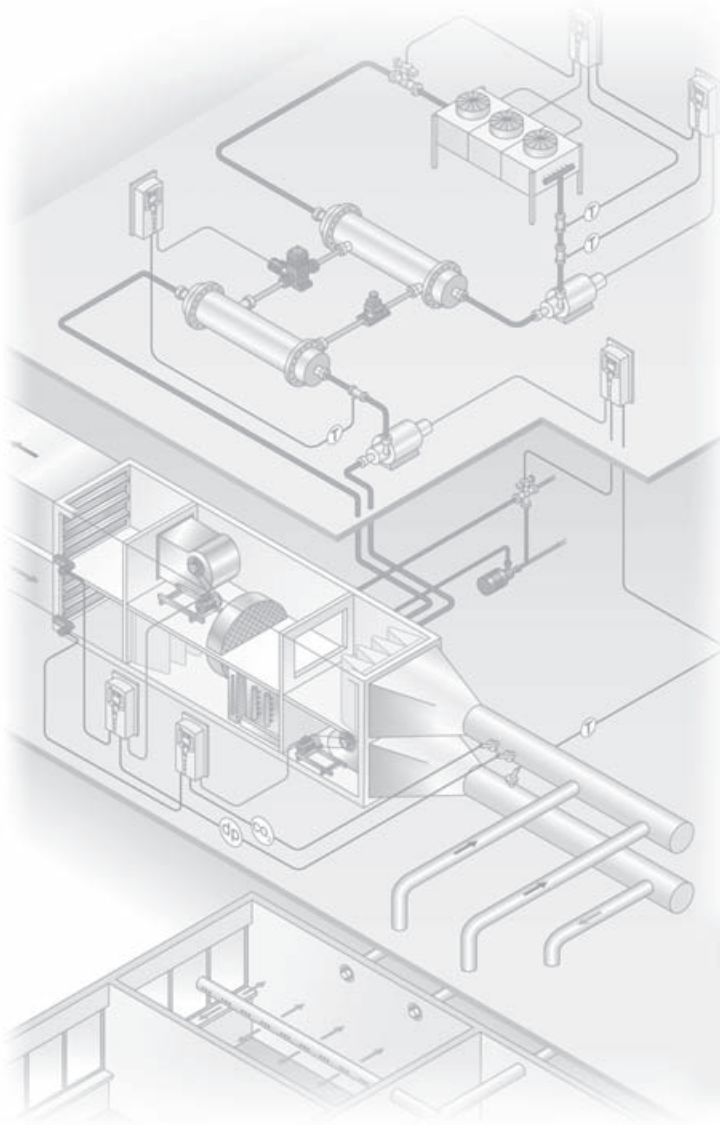
### Free standing units

R8	2024	N/A	347	617	230
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N/A = not applicable



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



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