

ABB drives for HVAC applications

ACH550, 0.75 to 355 kW

Drive^{IT} Low Voltage AC Drive



ABB drives for HVAC: Wide power range

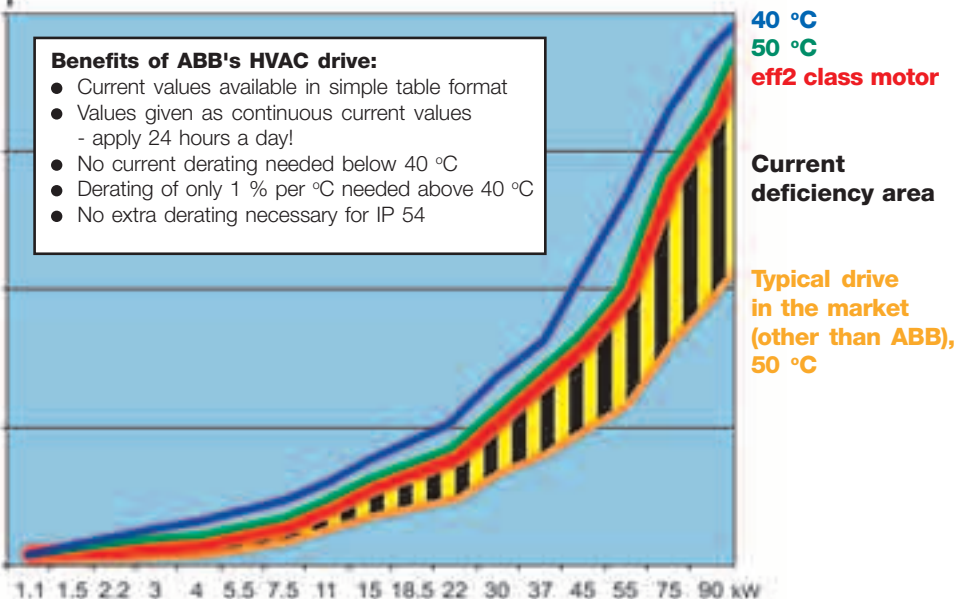
The introduction of a dedicated ABB drive for HVAC marks a significant milestone in the development of AC drives. Macros for the most common applications are built into the new drive as standard. Selecting the application takes only seconds. The rest of the start-up is intuitive, with a user interface as simple to use as a mobile phone.

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 in many HVAC installations. The ABB drive for HVAC fulfils demanding requirements for electromagnetic compatibility. A patent pending, swinging DC choke cuts harmonics emissions by up to 25 %.

Full output at 40 °C and above!

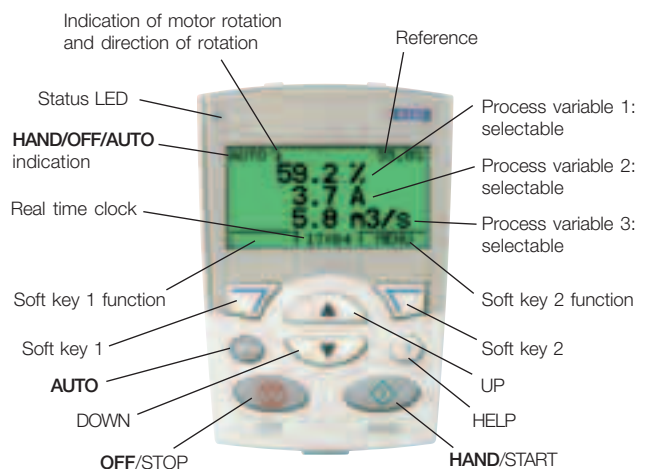
Ambient temperatures affect the output performance of each drive. The hotter it is outside - or inside the cabinet in which the drive is installed - the less current the drive can deliver. This means that the designer has to select the drive according to the peak temperature.



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

Tailor-made control panel for HVAC applications

- Guides the user through installation and start-up
- Help button always available
- Up- and downloading of parameters from one frequency converter to another
- Easily detachable by hand (both IP 21 and IP 54)
- Built-in real-time clock
- 14 languages available





Peace of mind

Wide power range

from 0.75 to 355 kW, 200/240 V or 380/480 V, covering the vast majority of HVAC applications.

Built-in EMC filter

EMC filter for 1st environment, built-in as standard, eliminates the need for any external filtering in building technology.

Real-time clock and calendar

The built-in real-time clock and calendar function provides true time and date stamps to drive events. Information is displayed clearly on the control panel.

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.

The motor can deliver full output at 40 °C - shouldn't the frequency converter 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, IP 54 units can be operated without the need for de-rating up to 40 °C. At a temperature of 50 °C, only 10 % de-rating is required for both IP 21 and IP 54.

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 a long history in building automation with more than 25,000 installed and running applications of N2 solutions alone.

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.



IP 21



"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."

- as standard!

Swinging DC chokes - up to 25 % less harmonics

ABB's patent pending swinging DC choke lets the HVAC drive deliver up to 25 % less harmonics at partial loads, compared to a conventional choke of equal size. There is no need to oversize the supply cables.

Multilingual control panel with hand-off-auto

If you can use a mobile phone, you can use the control panel of the HVAC drive, which features intuitive handling in 14 languages. Three process variables in engineering units or as a bar-chart are supported. Both IP 21 and IP 54 panels are detachable and able to copy parameters from one frequency converter to another. The panel can also be installed on the cabinet door with a fixing kit.

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.

HELP button always available

The control panel has a built-in help function to guide the user, enabling clear text advice without the need to refer to manuals.

Interactive start-up assistant

The HVAC drive has an interactive start-up assistant that expertly guides the user through the start-up, without the need to refer to manuals.

Tailor-made HVAC software features without compromises

ABB's 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 frequency converter and displayed in engineering units like bar, l/s and °C.

Motor protection with PTC or PT 100



"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, built-in. 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."



IP 54





“The energy saving capability of the 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 quite simply is always available to guide me.”



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



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



“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 built-in and plug-on fieldbuses 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.”



Peace of mind

Interactive maintenance assistant

Maintenance scheduling no longer requires guesswork. The 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 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.

Versatile software tools

DriveWindow Light 2 further facilitates commissioning and maintenance. Pump & Fan Save helps calculate energy savings and pay-back times. DriveSize optimizes the selection of the drive (frequency converter plus motor) according to the load requirements.



- as standard!

Flange mounting

The 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 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

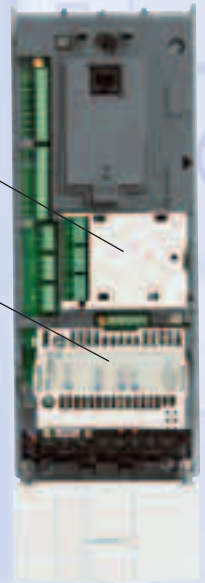
The HVAC drive has two independent PID controllers built in. As an example: one PID controller works with the frequency converter to maintain the duct static pressure. Simultaneously, the other PID controller can be used to control a separate external device, e.g. a chilled water valve. All of this can,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

Panel mounting side by side

ABB's HVAC drive is optimized for building into cabinets: no space is needed between the units, whether IP 21 or IP 54, even with the covers on.

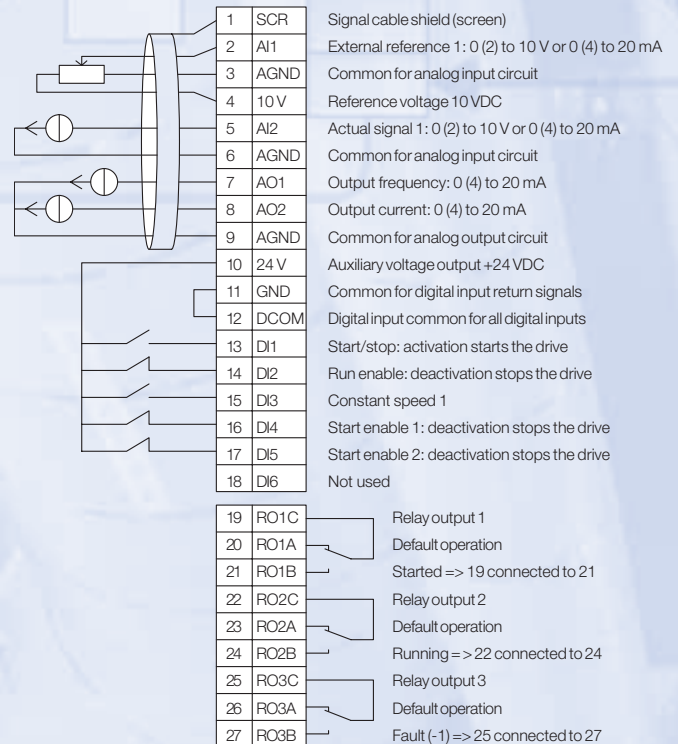
Options

- Relay extension module for three additional outputs (module fits under the cover of the HVAC drive).
- Fieldbus adapter modules (fit under the cover of the 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 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 | |
|--------------------------------|--|
| Voltage and power range | 3-phase, 380 to 480 V, +10/-15 % (0.75 to 355 kW) 3-phase, 200 to 240 V, +10/-15 % (0.75 to 75 kW) 1-phase, 200 to 240 V, +10/-15 % (50 % derating) auto-identification of input line |
| Frequency | 48 to 63 Hz |
| Power factor | 0.98 |

| Motor connection | |
|---|---|
| Voltage | 3-phase, from 0 to U_N |
| Frequency | 0 to 500 Hz |
| Rated currents (apply to both IP 21 and IP 54) | Current at ambient temperature of -15 to +40 °C: rated output current (I_{2N}), no de-rating needed Current at ambient temperature of +40 to +50 °C: de-rating of 1 %/°C above 40 °C, max. derating 10 % |
| Switching frequency | selectable 0.75 to 110 kW 1 kHz, 4 kHz, 8 kHz, 12 kHz 132 to 355 kW 1 kHz or 4 kHz |

| Environmental limits | |
|----------------------------|---|
| Ambient temperature | Transportation and storage -40 to 70 °C Operation -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 Relative humidity lower than 95 % (without condensation) |
| Protection classes | IP 21 or IP 54 IP 21 for wall mounted and free standing units IP 54 for wall mounted units |

| Inputs and outputs | |
|-------------------------|---|
| 2 analog inputs | selectable both for current and voltage Voltage signal 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, $R < 10 \text{ k}\Omega$ |
| 2 analog outputs | 0 (4) to 20 mA, load $< 500 \Omega$ Internal auxiliary voltage 24 V DC $\pm 10 \%$, max. 250 mA |
| 6 digital inputs | 12 V 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 | PTC any of the 6 digital inputs or analog inputs can be configured for PTC PT 100 both analog outputs can be used to feed the sensor |
| Fieldbuses | Built-in 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 | |
|-------------------------------------|---|
| | 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 and cUL approvals Galvanic isolation according to PELV |
| EMC (according to EN61800-3) | 1 st 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 |
| 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 | 44 | R4 | ACH550-01-044A-4 |
| 30 | 59 | R4 | ACH550-01-059A-4 |
| 37 | 72 | R4 | ACH550-01-072A-4 |
| 45 | 96 | R5 | ACH550-01-096A-4 |
| 55 | 124 | R6 | ACH550-01-124A-4 |
| 75 | 157 | R6 | ACH550-01-157A-4 |
| 90 | 180 | R6 | ACH550-01-180A-4 |
| 110 | 195 | R6 | ACH550-01-195A-4 |
| 132 | 245 | R7 | ACH550-02-245A-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.
ABB's HVAC drive can deliver I_{2N} continuously at an ambient temperature of 40 °C. In addition, 1,1 x 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 | | | | | | | | |
|------------|------------------------|-------|------|------|-----------|--------------------|------|------|-----------|
| | IP 21 / UL type 1 | | | | | IP 54 / 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 | 86 |

Free standing units

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

N/A = not applicable

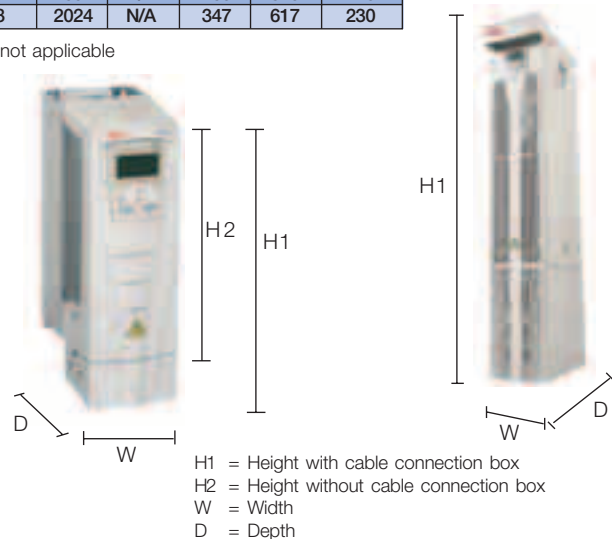




ABB Oy

Drives

P. O. Box 184

FIN - 00381 Helsinki

Finland

Telephone +358 10 22 11

Telefax +358 10 222 2681

E-mail hvac@fi.abb.com

Internet <http://www.abb.com/motors&drives>