

# Product datasheet

Specifications



variable speed drive, Altivar HVAC  
ATH600, ATH650, 2.2kW, 3hp, 380  
to 480V, 3 phase, IP55, UL type 12

ATH650U22N4

## Main

Range of product	Altivar HVAC ATH600
Product specific application	HVAC
Product or component type	Variable speed drive
Variant	Standard version
Device short name	ATH650
Product destination	Asynchronous motors Synchronous motors
Mounting mode	Wall mount
IP degree of protection	IP55 Type 12
Network number of phases	3 phases
[Us] rated supply voltage	380...480 V - 15...10 %
Relative symmetric mains voltage tolerance	10 %
Supply frequency	50...60 Hz - 5...5 %
Relative symmetric network frequency tolerance	5 %
nominal output current	5.1 A at 380 V (normal duty) 4.8 A at 480 V (normal duty) 3.7 A at 380 V (heavy duty) 3.4 A at 480 V (heavy duty)
Maximum transient current	5.6 A during 60 s (normal duty) 5.6 A during 60 s (heavy duty)
Motor power kW	2.2 kW for normal duty 1.5 kW for heavy duty
Motor power hp	3 hp for normal duty 2 hp for heavy duty
Line current	4.837 A at 380 V (normal duty) 3.8 A at 480 V (normal duty) 3.5 A at 380 V (heavy duty) 2.8 A at 480 V (heavy duty)
EMC filter	Class C2 EMC filter integrated
Safety function	STO (safe torque off)
Safety level	SIL 3 conforming to IEC 61508 PL = e conforming to ISO 13849-1
Cybersecurity function	True
Cybersecurity level and standard	Security level (SL) 1 conforming to IEC 62443-4-2
Communication port protocol	Modbus serial BACnet MS/TP

<b>Option card</b>	Communication module for BACnet IP Communication module for PROFINET Communication module for Ethernet IP/Modbus TCP Digital and analog I/O extension module Output relay extension module
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## Complementary

<b>Discrete input number</b>	8
<b>Discrete input type</b>	STOA, STOB safety input, 24 V DC DI1...DI6 digital input, 24 V DC, impedance: 4.4 kOhm DI5, DI6 programmable as pulse input: 0...30 kHz, 24 V DC
<b>Discrete input logic</b>	Positive logic (source) (DI1...DI6), $\leq 5$ V (state 0), $\geq 11$ V (state 1) Positive logic (source) (STOA, STOB), $\leq 5$ V (state 0), $\geq 11$ V (state 1) Negative logic (sink) (DI1...DI6), $> 16$ V (state 0), $< 10$ V (state 1) Positive logic (source) (DI5, DI6), $< 0.6$ V (state 0), $> 2.5$ V (state 1)
<b>Input compatibility</b>	DI1...DI6: discrete input level 1 PLC conforming to IEC 61131-2 DI5, DI6: pulse input level 1 PLC conforming to IEC 65A-68 STOA, STOB: discrete input level 1 PLC conforming to IEC 61131-2
<b>Supply</b>	External supply for control circuit: 24 V DC (19...30 V), $< 800$ mA, protection type: overload and short-circuit protection Internal supply for digital inputs and STO: 24 V DC (20.4...27 V), $< 200$ mA, protection type: overload and short-circuit protection Internal supply for reference potentiometer: 10.5 V DC $\pm 5\%$ , $< 10$ mA, protection type: short-circuit
<b>Analogue input number</b>	3
<b>Analogue input type</b>	AI1: 0...10 V DC, impedance: 30 kOhm, resolution 12 bits AI2: 0...20 mA (or 4-20 mA, x-20 mA, 20-x mA or other patterns by configuration), impedance: 250 Ohm, resolution 12 bits AI3: 0...20 mA (or 4-20 mA, x-20 mA, 20-x mA or other patterns by configuration), impedance: 250 Ohm, resolution 12 bits AI2, AI3 PTC/PT 100/PT 1000/KTY84 temperature probe
<b>Analogue output number</b>	2
<b>Analogue output type</b>	Software-configurable voltage AQ1, AQ2: 0...10 V impedance 470 Ohm, resolution 10 bits Software-configurable current AQ1, AQ2: 0...20 mA, resolution 10 bits
<b>Accuracy</b>	$\pm 1.5\%$ (AI1, AI2, AI3) for a temperature variation 60 °C $\pm 1\%$ (AQ1, AQ2) for a temperature variation 60 °C
<b>Linearity error</b>	AI1, AI2, AI3: $\pm 0.15\%$ of maximum value for analog input AQ1, AQ2: $\pm 0.2\%$ for analog output
<b>Relay output number</b>	3
<b>Relay output type</b>	Relay outputs R1A, R1B, R1C: 1 NO 1 NC electrical durability 100000 cycles Relay outputs R2A, R2C: 1 NO electrical durability 100000 cycles Relay outputs R3A, R3C: 1 NO electrical durability 100000 cycles
<b>Sampling duration</b>	2 ms + 0...0.5 ms DI1...DI6 digital input 5 ms + 0...1 ms DI5, DI6 pulse input 5 ms + 0...1 ms AI1, AI2, AI3 10 ms + 0...1 ms AQ1, AQ2 5 ms $\pm 0.5$ ms R1, R2, R3
<b>Maximum switching current</b>	Relay output R1, R2, R3 on resistive load load: 3 A at 250 V AC Relay output R1, R2, R3 on resistive load load: 3 A at 30 V DC Relay output R1, R2, R3 on inductive load load, $\cos \phi = 0.4$ and L/R = 0.7 ms: 2 A at 250 V AC Relay output R1, R2, R3 on inductive load load, $\cos \phi = 0.4$ and L/R = 0.7 ms: 2 A at 30 V DC
<b>Minimum switching current</b>	Relay output R1, R2, R3: 5 mA at 24 V DC
<b>Physical interface</b>	2-wire RS 485
<b>Connector type</b>	RJ45 and open style terminals
<b>Method of access</b>	Server Modbus RTU Subordinate BACnet MS/TP

<b>Transmission rate</b>	4800 bps, 9600 bps, 19200 bps, 38.4 Kbps 9.6, 19.2, 38.4, 76.8 kbit/s
<b>Transmission frame</b>	RTU MS/TP
<b>Number of addresses</b>	1...247 1...127
<b>Data format</b>	8 bits, configurable odd, even or no parity 8 bits, no parity, 1 stop
<b>Type of polarization</b>	120 ohm termination or no impedance
<b>Prospective line Isc</b>	5 kA
<b>Output frequency</b>	0.4 kHz
<b>Output voltage</b>	<= power supply voltage
<b>4 quadrant operation possible</b>	False
<b>Asynchronous motor control profile</b>	Voltage/frequency ratio, 5 points Flux vector control with sensor, standard Voltage/frequency ratio - Energy Saving, quadratic U/f Flux vector control without sensor - Energy Saving Voltage/frequency ratio, 2 points
<b>Synchronous motor control profile</b>	Vector control without sensor
<b>Acceleration and deceleration ramps</b>	Acceleration/deceleration ramp adaptation Linear S, U or customized
<b>Motor slip compensation</b>	Adjustable Automatic whatever the load Can be suppressed Not available with synchronous motors
<b>Switching frequency</b>	6...16 kHz adjustable with derating factor
<b>Nominal switching frequency</b>	6 kHz
<b>Braking to standstill</b>	By DC injection
<b>Brake chopper integrated</b>	False
<b>Apparent power</b>	3.2 kVA (normal duty) 2.3 kVA (heavy duty)
<b>power loss static current independent</b>	22 W
<b>Power dissipation in W</b>	85 W, switching frequency 6 kHz (normal duty) 68 W, switching frequency 6 kHz (heavy duty)
<b>Standards</b>	UL 61800-5-1 EN/IEC 61800-3 EN/IEC 61800-5-1 IEC 61000-3-12 IEC 60721-3 IEC 61508 IEC 13849-1 RoHS
<b>Product certifications</b>	CE UKCA UL CULus EAC RCM KCC ATEX

<b>Marking</b>	CE UKCA CULus EAC RCM ATEX WEEE ROHS KCC
<b>With safety function Safe torque off (STO)</b>	True
<b>Protection type</b>	Thermal overload protection: motor Safe torque off: motor Motor phase loss: motor Against exceeding limit speed: motor Temperature protection: drive Overheating: drive Output overcurrent between motor phase and earth: drive Output overcurrent between motor phases: drive Short-circuit between motor phase and earth: drive Short-circuit between motor phases: drive DC Bus overvoltage: drive Line supply overvoltage: drive Line supply undervoltage: drive Input supply loss: drive Break on the control circuit: drive
<b>Width</b>	189 mm
<b>Height</b>	375 mm
<b>Depth</b>	247 mm
<b>Product weight</b>	4.5 kg
<b>Function available</b>	Fire mode Forced fire mode Run permissive PID controller 3 additional PID Damper control Underload detection for broken belt Scroll compressor management Skipped frequencies Catch on the fly Power monitoring Cybersecure firmware update

## Environment

<b>Operating altitude</b>	1000 m without derating 1000...3000 m with current derating 1 % per 100 m
<b>Operating position</b>	Vertical position
<b>Electromagnetic compatibility</b>	Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2 Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3 Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4 1.2/50 $\mu$ s - 8/20 $\mu$ s surge immunity test level 3 conforming to IEC 61000-4-5 Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6
<b>Environmental class (during operation)</b>	Class 3C3 according to IEC 60721-3-3 Class 3S3 according to IEC 60721-3-3 Class 3B1 according to IEC 60721-3-3
<b>Maximum acceleration under shock impact (during operation)</b>	15 gn at 11 ms
<b>Maximum acceleration under vibrational stress (during operation)</b>	1 gn at 13...200 Hz
<b>Maximum deflection under vibratory load (during operation)</b>	1.5 mm at 2...13 Hz
<b>Relative humidity</b>	5...95 % without condensation conforming to IEC 60068-2-3
<b>Noise level</b>	47 dB

Pollution degree	2
Ambient air temperature for operation	-15...40 °C without derating 40...50 °C with derating factor
Ambient air temperature for storage	-40...70 °C

## Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	31.000 cm
Package 1 Width	27.000 cm
Package 1 Length	44.000 cm
Package 1 Weight	6.025 kg
Unit Type of Package 2	S06
Number of Units in Package 2	3
Package 2 Height	75.000 cm
Package 2 Width	60.000 cm
Package 2 Length	80.000 cm
Package 2 Weight	31.000 kg

## Contractual warranty

Warranty (in months)	18
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## Environmental Data

Schneider Electric aims to achieve Net Zero status by 2050 through supply chain partnerships, lower impact materials, and circularity via our ongoing “Use Better, Use Longer, Use Again” campaign to extend product lifetimes and recyclability.

[Environmental Data explained >](#)

[How we assess product sustainability >](#)



### Environmental footprint

Total lifecycle Carbon footprint	1 578 kg CO2 eq.
Carbon footprint of the manufacturing phase [A1 to A3]	99 kg CO2 eq.
Carbon footprint of the distribution phase [A4]	1 kg CO2 eq.
Carbon footprint of the installation phase [A5]	3 kg CO2 eq.
Carbon footprint of the use phase [B2, B3, B4, B6]	1 469 kg CO2 eq.
Carbon footprint of the end-of-life phase [C1 to C4]	6 kg CO2 eq.
Environmental Disclosure	<a href="#">Product Environmental Profile</a>

### Use Better



### Materials and Substances

Packaging made with recycled cardboard	Yes
Packaging without single use plastic	Yes
SCIP Number	Be97ec3a-c35f-4529-8372-6528ac48d635
EU RoHS Directive	<a href="#">Compliant By Exemption</a>
REACH Regulation	<a href="#">Reference contains Substances of Very High Concern above the threshold</a>

### Use Longer



### Lifetime extension

Repair	No
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### Use Again



### Repack and remanufacture

Recyclability potential, in %	76
End of life manual availability	<a href="#">End of Life Information</a>
Removable battery	Yes
Take-back	No

Image of product / Alternate images

Alternative

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