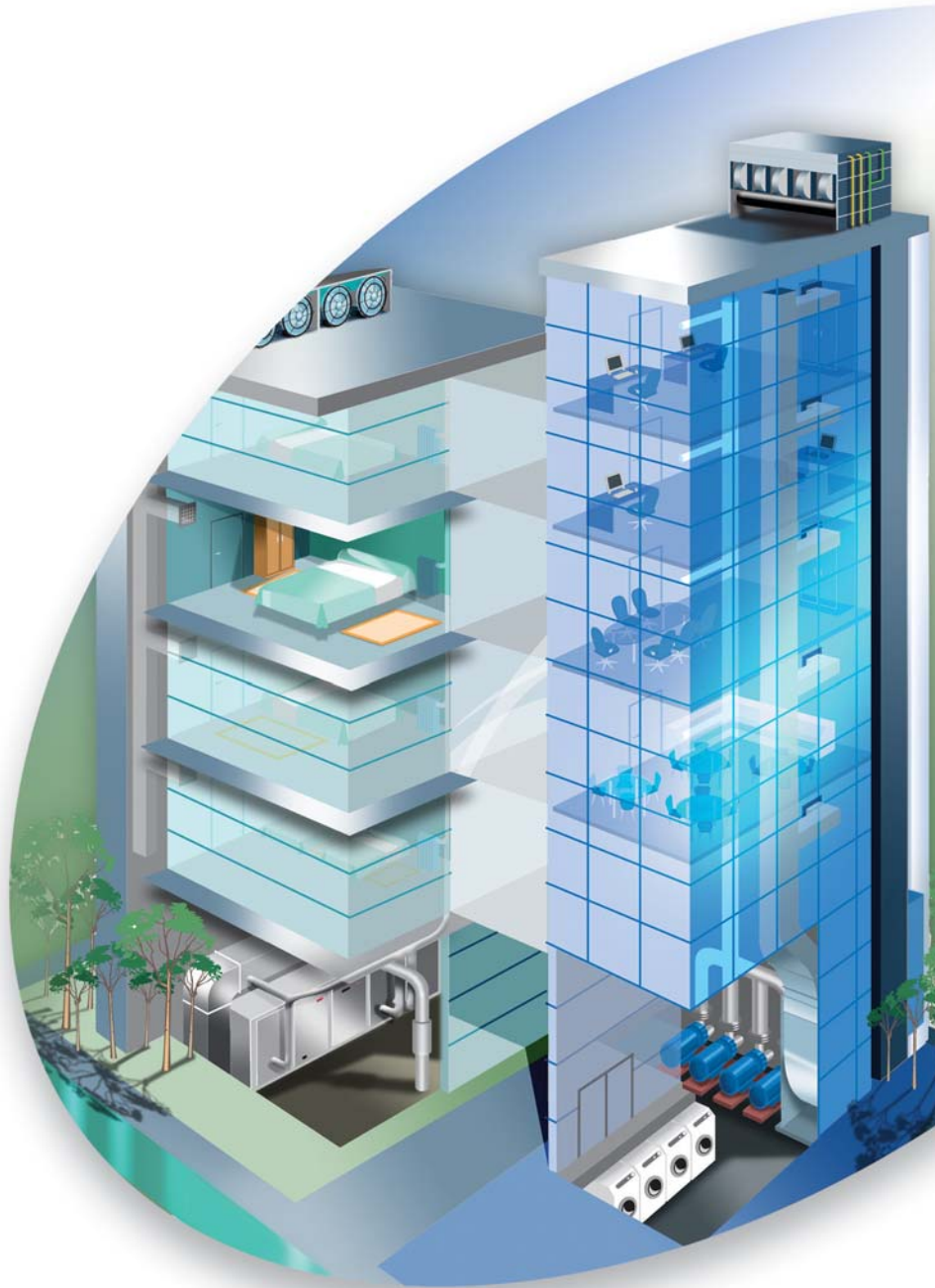


Altivar® 21

Variable speed AC drives

Unmatched value for HVAC



For 3-phase asynchronous motors from 1 HP to 100 HP



Simply Smart!

Leverage
ingenuity
and intelligence
for ease of use

The *essential connection* between you and your pump and fan applications!

The Telemecanique® brand Altivar® 21 variable speed AC drive controller offers just the right features for centrifugal pump and fan applications. Offering unmatched value in installed cost and functionality for HVAC equipment, this new range of drives allows original equipment manufacturers and control panel builders to focus on the essentials.

The economical choice

- Reduces installation costs by eliminating throttling valves or inlet guide vanes typically used to control flow, and saves time with quick installation and wiring.
- Provides energy savings by reducing motor speed for a quick return on investment.
- The Altivar 21 drive energy economizing motor algorithm maximizes energy savings.

Simple installation and operation

- Parameters are factory configured immediate start-up.
- Features pump and fan macro-configurations for easy and quick commissioning.
- Includes local controls for testing and troubleshooting.

Save and download configuration files

- PC software.
- Remote keypad/display.

Compact footprint

- Small size and side-by-side mounting require less panel space.

Easy integration into building management systems

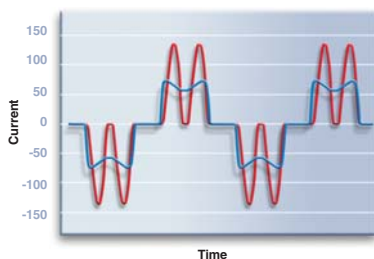
- Internally mounted option cards connect to Lonworks, BACnet, MetaSYS N2 and APOGEE P1 FLN networks.
- Complies with international standards and certifications: CE, UL, CSA, C-Tick, etc.

Harmonics mitigating design

- Eliminates the need for line reactors and chokes for reducing harmonics: THDI < 30% (IEC61000-3-12 < 48%).



Communication option board





Remote mount keypad/display



Onboard keypad/display

Onboard and remote-mounted keypad and display for *configuration* and *monitoring*

- Four segment LED display with run status LED and unit indicator LED (percent or Hz).
- Run/stop buttons and up/down arrow keys for local speed control.
- Run status LED and unit indicator LED (percent or Hz).
- Local/remote button with LED indicators.
- Programming buttons include MODE, ENT and up/down arrows.

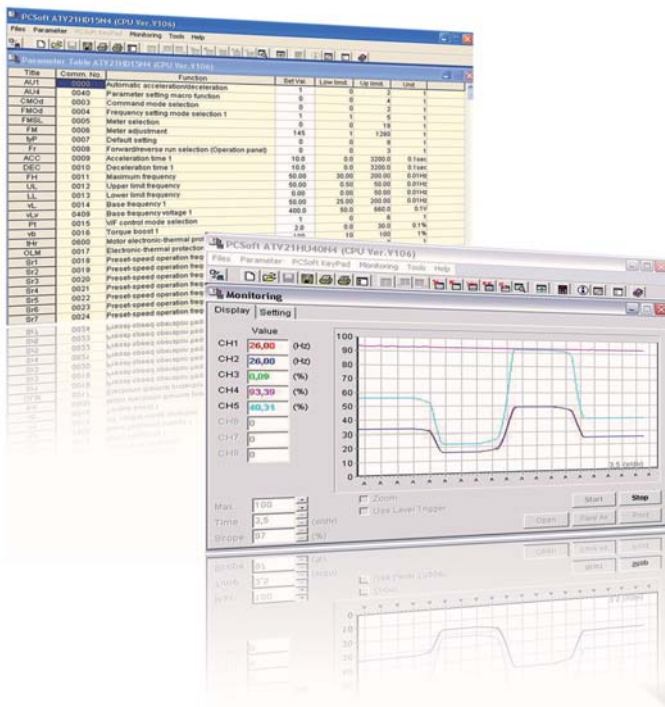
Remote mount keypad/display additional functions:

- The IP65 rated.
- Includes ability to store three (A, B, C) drive configurations.

Start up *right* with PC *Soft!*

PC Soft is an easy to use software program for commissioning the Altivar 21 drive. Capabilities include:

- Parameter adjustments.
- Store and transfer drive configuration files.
- 8 channel Oscilloscope function to monitor I/O, drive and motor operation.
- Work in either on or/off-line modes.
- PC Soft can be downloaded at no cost from www.us.telemecanique.com.



Manage and your buildings

Enjoy the benefits from a drive des pump and fan applications.

Ventilation:

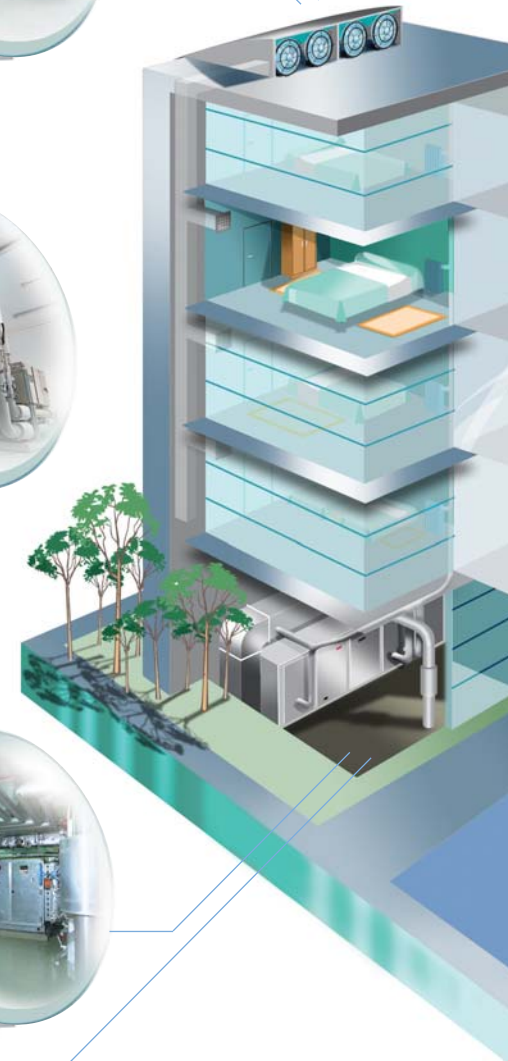
- **Detection** of fan belt breakage.
- Automatic **restart**, catch on the fly.
- **Jump frequencies**.

Pumping:

- **Continuous service** assured in the event of loss of feedback signals: fallback position, automatic/manual operation.
- **Safety and protection of pump:**
Detection of current threshold.
Limitation of operating time at low speed.
PTC probe management.

Heating and air conditioning:

- Adjustment of flow rates on the basis of actual needs for better **energy management** using the internal PI regulator.
- **Suppression of mechanical resonance** and noise using jump frequencies and the switching frequency, adjustable to 16 kHz, during operation.
- **Reduction of consumption** using energy saving and quadratic ratios.
- **Installation monitoring:** diagnostics, fault management, alarms.



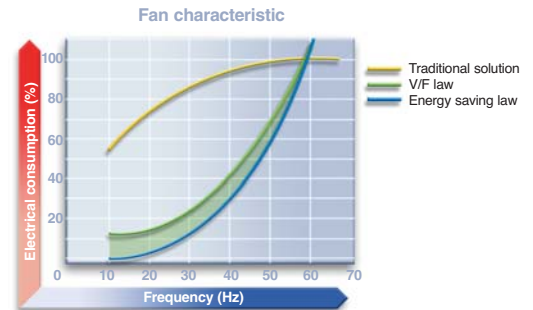
monitor using Altivar® 21 drives.

designed specifically for



Ventilation: Supply and return air fans

- **Enhanced comfort** by reducing noise pollution caused by the motor with random switching frequency modulation.



Ventilation: safety/smoke extraction

- Drive **forced start** function with fault inhibition, selection of running direction and speed reference.
- Catch on the fly by **speed search**, regardless of the direction of rotation to start windmilling fans.

Pumping: water regulation

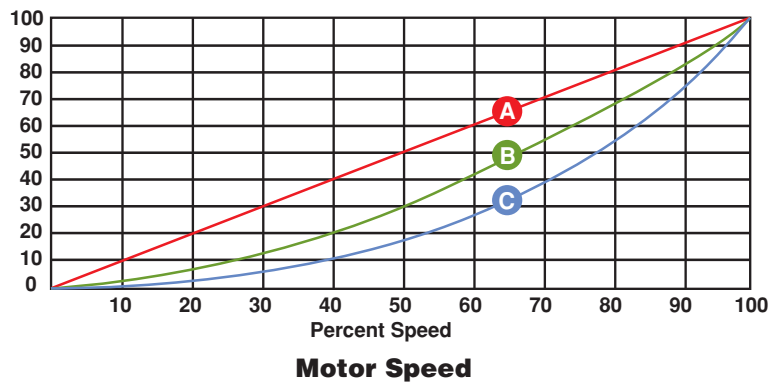
- Essential functions for the **protection** of your installations.
- **Detection** of underload, overload.
- **Detection** of absence of fluid.

Go *green* with Altivar® 21 drives!

Let the Altivar 21 drives operate your buildings with greater efficiency; using them on fans and pumps can significantly reduce your energy costs. In many instances, the payback period for installing adjustable frequency drives in place of other flow control methods is less than 12 months.

Most HVAC systems are designed to keep the building cool on the hottest days and warm on the coldest days. Therefore, the HVAC system only needs to work at full capacity on the 10 or so hottest days and the 10 or so coldest days of the year. On the other 345 days, the HVAC system may operate at a reduced capacity. This is where a variable air volume system with variable frequency drives (VFDs) can be used to match air flow to actual heating and cooling demands. The VFD can reduce the motor speed when full flow is not required, thereby reducing the power required and the electrical energy used.

Percent
Flow, Pressure, HP



- A** = Flow as a function of motor speed
- B** = Pressure as a function of motor speed
- C** = Horsepower as a function of motor speed

An example of an energy saving calculation*

A fan with a 20 horsepower motor supplies air 10 hours a day for 260 days a year and the energy cost is \$0.10 cents per kilowatt-hour.

Cost of running the motor at full speed:

$$20 \text{ HP} \times 0.746 \text{ kW/HP} \times 2600 \text{ hours} \times \$0.10/\text{kWhr} = \mathbf{\$3,879.20}$$

Assuming the fan does not need to run at full speed for the full 2600 hours, let's use an example where it runs at full speed 25% of the time, at 80% for 50% of the time, and at 60% for the remaining 25% of the time:

Cost of running with an AC drive controlling the motor:

$$20 \text{ HP} \times (1/3) \times 0.746 \text{ kW/HP} \times 650 \text{ hours} \times \$0.10/\text{kWhr} = \$969.80$$

$$20 \text{ HP} \times (0.8)^3 \times 0.746 \text{ kW/HP} \times 1300 \text{ hours} \times \$0.10/\text{kWhr} = \$993.08$$

$$20 \text{ HP} \times (0.6)^3 \times 0.746 \text{ kW/HP} \times 650 \text{ hours} \times \$0.10/\text{kWhr} = \$209.48$$

$$\mathbf{Total} = \mathbf{\$2,172.36}$$

$$\mathbf{Annual savings: \$3,879.20 - \$2,172.36 = \$1,706.84}$$

*Actual results may vary for closed loop pumping and variable air volume systems.

Altivar® 21 drives

Thinking of the future: conserving earth's *energy*

Within its sustainable development policy, Schneider Electric is committed to environmental friendliness.

“Our products safeguard life, make goods safer and optimize the consumption of energy and natural resources. We are actively involved in design, production, distribution and recycling processes that are environmentally friendly. Protection of the environment forms an integral part of our strategic decision making.”

Manufacturing is compliant with ISO 14001: materials used for the Altivar 21 drive have been selected for their minimal impact on the environment. Conformity to the European directive ROHS (Restriction Of Hazardous Substances) that prohibits the use of materials such as lead, cadmium, mercury and hexavalent chromium.

A variable air/water/refrigerant volume HVAC system controlled by VFDs will go a long way in helping a new or existing building achieve greater energy efficiency. Not only will HVAC systems run by VFDs save money, but they also will increase the comfort of the building and reduce equipment maintenance costs and downtime. Plus, meeting the requirements of the Energy Policy Act of 2005 and achieving a more “green” system through LEED certification can offer more money-saving opportunities if the building is eligible for state and local government incentives. Ultimately, more efficient HVAC systems create more energy efficient buildings, which in turn conserves energy resources across the U.S. and the world.



The *green building* movement is on!

The Altivar 21 drive can help create green buildings. The U.S. Green Building Council® (USGBC) developed and administered the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™ to define green buildings. One of the prerequisites of the LEED-NC Energy and Atmosphere component is meeting both the mandatory provisions and prescriptive/performance requirements of ASHRAE 90.1-2004. This standard sets minimum requirements to promote the principles of effective, energy-conserving

design for buildings and building systems. More specifically, the ASHRAE prescriptive strongly recommends that HVAC systems with total fan power greater than 5 HP have variable air volume fan control and that individual variable air volume fans with motors greater than or equal to 15 HP have variable speed drives.

For government buildings, government regulations such as the Energy Policy Act of 2005 (EPA Act) mandate energy monitoring and energy efficiency improvements. LEED certification alone has its benefits. In addition to saving energy costs, it also allows the building owner to take advantage of state and local government incentives and makes the building project more marketable to tenants who are seeking more energy-efficient/sustainable facilities. The Altivar 21 drive can help create green buildings by providing gains in energy efficiency, easier commissioning and monitoring of the building and by its Eco-Design.

Selection guide

Supply voltage: Three Phase 200-240V IP20

kW	HP	Amps	Reference	Frame size
0.75	1	4.6	ATV 21H075M3X	1
1.5	2	7.5	ATV 21HU15M3X	1
2.2	3	10.6	ATV 21HU22M3X	1
3	–	13.7	ATV 21HU30M3X	2
4	5	17.5	ATV 21HU40M3X	2
5.5	7.5	24.2	ATV 21HU55M3X	3
7.5	10	32.0	ATV 21HU75M3X	3
11	15	46.2	ATV 21HD11M3X	4
15	20	61	ATV 21HD15M3X	4
18.5	25	74.8	ATV 21HD18M3X	4
22	30	88	ATV 21HD22M3X	5
30	40	117	ATV 21HD30M3X	6

Supply voltage: Three Phase 380-480V IP20

kW	HP	Amps	Reference	Frame size
0.75	1	2.2	ATV 21H075N4	1
1.5	2	3.7	ATV 21HU15N4	1
2.2	3	5.1	ATV 21HU22N4	1
3	–	7.2	ATV 21HU30N4	2
4	5	9.1	ATV 21HU40N4	2
5.5	7.5	12	ATV 21HU55N4	2
7.5	10	16	ATV 21HU75N4	3
11	15	22.5	ATV 21HD11N4	3
15	20	30.5	ATV 21HD15N4	4
18.5	25	37	ATV 21HD18N4	4
22	30	43.5	ATV 21HD22N4	5
30	40	58.5	ATV 21HD30N4	5
37	50	79	ATV 21HD37N4	6
45	60	94	ATV 21HD45N4	6
55	75	116	ATV 21HD55N4	7
75	100	160	ATV 21HD75N4	7

Supply voltage: Three Phase 380-480V IP54

kW	HP	Amps	Reference	Frame size
0.75	1	2.2	ATV 21W075N4	1
1.5	2	3.7	ATV 21WU15N4	1
2.2	3	5.1	ATV 21WU22N4	2
3	–	7.2	ATV 21WU30N4	2
4	5	9.1	ATV 21WU40N4	2
5.5	7.5	12	ATV 21WU55N4	2
7.5	10	16	ATV 21WU75N4	2
11	15	22.5	ATV 21WD11N4	3
15	20	30.5	ATV 21WD15N4	3
18.5	25	37	ATV 21WD18N4	4
22	30	43.5	ATV 21WD22N4	5
30	40	58.5	ATV 21WD30N4	5
37	50	79	ATV21WD37N4	6
45	60	94	ATV21WD45N4	6
55	75	116	ATV21WD55N4	7
75	100	160	ATV21WD75N4	7

Accessories guide

User Interface Kits

Description	Catalog Number
Remote Keypad Display Mounting Kit Includes remote keypad, hardware and cable. IP65 rated	VW3A21101
PC Soft Test and Commissioning Software Free for download on Telemecanique.com	VW3A2104
PC Connection Kit	VW3A8106

Communication Card Kits

Description	Catalog Number
LONWORKS	VW3A21312
METASYS N2	VW3A21313
APOGEE FLN P1	VW3A21314
BACnet	VW3A21315

Note: Only logic inputs F and R, analog input VIB, relay output FL, common and 24 V supply terminals and RJ45 Modbus connector are available when a communication option card is installed.

Field Installed Kits

Description	For Drives	Catalog Number	
DIN Rail Mount Kit Din Rail Mounting Plate for 35 mm wide din rail	ATV21H075M3X...HU22M3X	VW3A31852	
	ATV21H075N4...HU22N4		
Conduit Entrance Kit for UL Type 1 rating multiple knockout sizes	ATV21H075M3X...HU22M3X	VW3A31814	
	ATV21H075N4...HU22N4		
	ATV21HU30M3X° HU40M3X	VW3A31815	
	ATV21HU30N4...HU55N4		
	ATV21HU55M3X, HU75M3X	VW3A31816	
	ATV21HU75N4, HD11N4		
	ATV21HD11M34X...HD18M3X	VW3A31817	
ATV21HD15N4...HD18N4			
RFI Input Filter For compliance with European (CE) conducted emissions standard 55022 Class B	ATV21HD22M3X	VW3A9206	
	ATV21HD22N4, HD30N4		
	ATV21HD37N4, HD45N4	VW3A9207	
	ATV21HD30M3X	VW3A9208	
	ATV21HD55N4, HD75N4		
	Three phase supply voltage: 200 to 240 V 50/60 Hz	ATV21H075M3X ATV21HU15M3X	VW3A31404
		ATV21HU22M3X ATV21H075N4	
ATV21HU15N4 ATV21HU22N4			
ATV21HU30M3X ATV21HU40M3X		VW3A31406	
ATV21HD22M3X			
Three phase supply voltage: 300 to 500 V 50/60 Hz	ATV21HU55M3X ATV21HU75M3X	VW3A31407	
	ATV21HD11M3X ATV21HD15M3X	VW3A31408	
	ATV21HD18M3X ATV21HD30M3X		
	ATV21H075N4 ATV21HU15N4	VW3A31404	
	ATV21HU22N4		
Three phase supply voltage: 300 to 500 V 50/60 Hz	ATV21HU30N4 ATV21HU40N4	VW3A31406	
	ATV21HU55N4 ATV21HD22N4		
	ATV21HD30N4		
	ATV21HU75N4 ATV21HD11N4	VW3A31407	
	ATV21HD37N4 ATV21HD45N4		
Three phase supply voltage: 300 to 500 V 50/60 Hz	ATV21HD55N4 ATV21HD75N4	VW3A31408	
	ATV21HD15N4 ATV21HD18N4	VW3A31409	

Specifications

Electrical

Input Voltage	200 -15% to 240 +10%, 380 -15% to 480 +10%
Input Frequency	50 Hz -5% to 60 Hz +5%
Drive Input Section	Six pulse bridge rectifier
Drive Output Section	Three Phase, IGBT Inverter with Pulse Width Modulated (PWM) output Maximum voltage equal to input voltage
Galvanic Isolation	Galvanic isolation between power and control (inputs, outputs and power supplies)
Frequency Range of Power Converter	0.5 to 200 Hz
Torque/Overtorque	120% of nominal motor torque for 60 seconds
Current (transient)	110% of controller rated current for 60 seconds, 180% for 2 seconds
Switching Frequency	Selectable from 6 to 16 kHz, 12 kHz nominal rating for 1 HP to 20 HP @ 200/240 V, 380/480 V Selectable: 6 to 16 kHz, 8 kHz nominal rating for 30 HP to 40 HP @ 200/240 V, 30 HP to 100 HP @ 380/480 V
Logic Inputs	3 logic inputs (F,R,RES) 24 Vdc, compatible with level 1 PLC, IEC 65A-68 standard Impedance: 3.5 k Ω , Maximum voltage: 30 Vdc, Max. sampling time: 2 ms \pm 0.5 milliseconds Multiple assignment makes it possible to configure several functions on one input
Speed Reference Inputs	VIA: Voltage analog input 0 to 10 Vdc, impedance 30 k Ω (max. safe voltage: 24 Vdc). Analog current input X-Y mA by programming X and Y from 0 to 20 mA, with impedance 242 Ω . Can also be configured as a logic input VIB: Voltage analog input, configurable as an analog input or as a PTC probe input. 0 to 10 Vdc, impedance 30 k Ω (max. safe voltage 24 Vdc)
Analog Reference Resolution	0.0048 Hz (11 bits)
Relay Outputs	FL (FLA,FLB,FLC) 1 N/C contact, and 1 N/O contact with common point R (RY,RC) 1 N/O contact Maximum switching capacity: • On resistive load (cos ϕ = 1): 5 A for 250 Vac or 30 Vdc • On inductive load (cos ϕ = 0.4 and L/R = 7 ms): 2 A for 250 Vac or 30 Vdc
I/O Sampling Time	2 milliseconds \pm 0.5 milliseconds on analog inputs & outputs, & logic inputs, 7 milliseconds \pm 0.5 milliseconds on relay outputs
Acceleration and Deceleration Ramps	0.1 to 3200 seconds (definition in 0.1 seconds increments)
Skip Frequencies	Three configurable skip frequency/jump frequency bands
Motor Control Profiles	Energy economizer (flux optimization) motor algorithm to maximize energy savings. (Automatically optimizes voltage based on load) or select volts/hertz profile or SLFV (sensorless flux vector)
Speed Range	1:10
Motor Protection	Class 10 electronic overload protection
Keypad/Display Terminal	4 segment, LED display with Run and Units LED indication. Run/Stop, Local/remote (with LED indication), and programming buttons. Quick Start, Fault History, I/O mapping, Last-used menus. Status Monitoring and self diagnostics with fault messages and status such as: Power on time, elapsed time, motor run time, line voltage, motor current, ready to run, running, motor speed, etc.
Compliance	RoHS
Codes and Standards	UL, CSA, NOM 117, DNV, CE, C-Tick, HPST, UL 1995 Plenum rated

Environmental

Temperature	Storage: -13 to +158 °F (-25 to +70 °C) Operation: +14 to +104 °F (-10 to +40 °C) without derating, +14 to +122 °F (-10 to +50 °C) with derating
Humidity	95% with no condensation or dripping water, conforming to IEC 600068-2-3.
Altitude	Up to 3,300 ft (1,000 m) without derating; derate by 1% for each additional 330 ft (100 m) up to 10,000 ft (3,000 m) Limit to 6,600 ft (2,000 m) if supplied by corner grounded distribution system
Enclosure Rating	• NEMA/UL open type (IP20) with top vent cover removed. • NEMA/UL Type 1 with the top vent cover in place and with the Conduit Entry Kit installed • IP21 and IP41 and on top of drive controller
Pollution Degree	1 HP to 25 HP @ 200/240 V, 1 HP to 5 HP @ 380/480 V: Pollution degree 2 per IEC/EN 61800-5-1, 30 HP to 40 HP @ 200/240 V, 30 HP to 100 HP @ 380/480 V: Pollution degree 3 per IEC/EN 61800-5-1
Vibration Resistance	1.5 mm peak to peak from 3 to 13 Hz, 1 gn from 13 to 150 Hz, conforming to IEC/EN 60068-2-6
Shock Resistance	15 gn for 11 ms conforming to IEC/EN 60068-2-27

Dimensions and weights

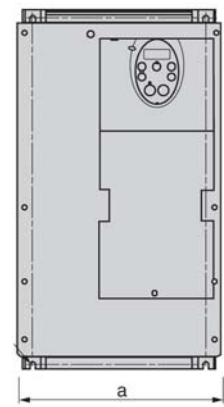
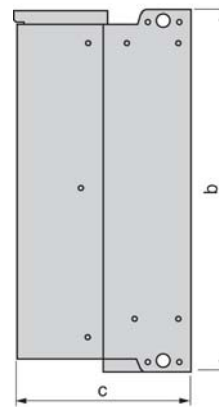
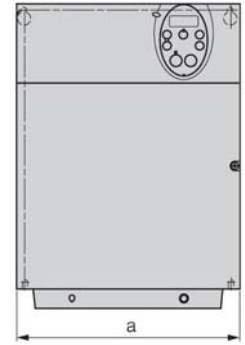
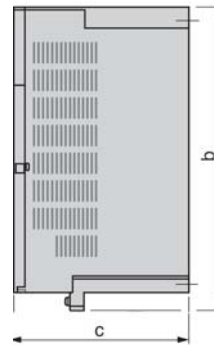
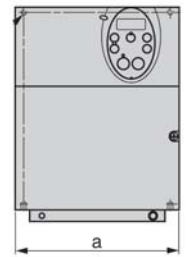
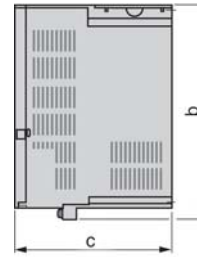
IP20

Frame Size	a Width		b Height		c Depth		Appr. Weight	
	mm	In.	mm	In.	mm	In.	kg.	lbs.
1	105	4.13	143	5.63	150	5.91	1.2	2.65
2	140	5.51	184	7.24	150	5.91	2.4	5.29
3	180	7.09	232	9.13	170	6.69	4.7	10.36
4	245	9.65	295	11.61	213	8.39	7	15.44
5	240	9.45	400	15.75	213	8.39	9	19.85
6	240	9.45	550	21.65	244	9.61	38.1	84.01
7	320	12.60	630	24.80	289.9	11.41	55.4	122.16

UL Type 1

b Height with Type 1 Conduit Kit	
mm	in.
211	8.31
252	9.92
328	12.91
394	15.51
460	18.11
686	27.01
833	32.80

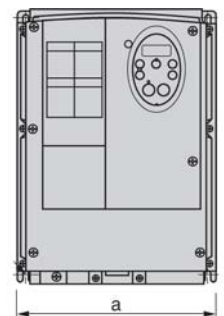
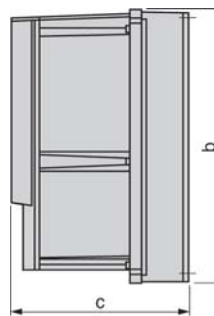
IP20 Drives



IP54

Frame Size	a Width		b Height		c Depth		Appr. Weight	
	mm	In.	mm	In.	mm	In.	kg.	lbs.
1	215	8.46	297	11.69	192	7.56	7	15.44
2	230	9.06	340	13.39	208	8.19	9.65	21.28
3	290	11.42	560	22.05	315	12.40	30.3	66.81
4	310	12.20	665	26.18	315	12.40	37.4	82.47
5	284	11.18	720	28.35	315	12.40	49.5	109.15
6	284	11.18	880	34.65	343	13.59	57.4	126.57
7	362	14.25	1000	39.51	364	14.33	61.9	136.49

IP54 Drives



The efficiency of Telemecanique® branded *solutions*

Used in combination, Telemecanique products provide quality solutions, meeting all your automation and control application requirements.



Simple machines

Altistart® 01: 0.25 HP to 75 HP

Altivar® 11: 0.25 HP to 3 HP

Altivar 31: 0.25 HP to 20 HP



Complex, high power machines

Altivar 71: 0.5 HP to 700 HP



Pumping and ventilation machines

Altistart 48: 3 HP to 1200 HP

Altivar 21: 1 HP to 100 HP

Altivar 61: 1 HP to 900 HP



A worldwide presence

Schneider Electric is a global supplier of electrical distribution, automation and control equipment products under the brand names of Square D®, Telemecanique and Merlin Gerin®. For over 100 years, Schneider Electric has been an innovator in manufacturing products that are tailored to the demanding specifications of our customers. Backed by a global organization of 80,000 employees in 130 countries, Schneider Electric is a global electrical industry leader. With one of the strongest distribution networks in the U.S. and around the world, you can count on Schneider Electric to keep your business running smoothly and efficiently.

Schneider Electric has been providing adjustable frequency drive solutions for HVAC and pumping applications for over 30 years. Schneider Electric has made a significant investment in research and development to design in a new generation of products to serve the HVAC and pumping marketplace.

Schneider Electric - North American Operating Division

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