

# ATV21HD22M3X

variable speed drive ATV21 - 22kW, 30HP -  
240V - IP20



## Main

|                                    |                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Range of product                   | Altivar 21                                                                                                                                                                                                                                                                                                                                         |
| Product or component type          | Variable speed drive                                                                                                                                                                                                                                                                                                                               |
| Product destination                | Asynchronous motors                                                                                                                                                                                                                                                                                                                                |
| Product specific application       | Pumps and fans in HVAC                                                                                                                                                                                                                                                                                                                             |
| Assembly style                     | With heat sink                                                                                                                                                                                                                                                                                                                                     |
| Component name                     | ATV21                                                                                                                                                                                                                                                                                                                                              |
| EMC filter                         | Without EMC filter                                                                                                                                                                                                                                                                                                                                 |
| Power supply voltage               | 200...240 V (- 15...10 %)                                                                                                                                                                                                                                                                                                                          |
| Network number of phases           | 3 phases                                                                                                                                                                                                                                                                                                                                           |
| Motor power kW                     | 22 kW                                                                                                                                                                                                                                                                                                                                              |
| Motor power hp                     | 30 hp                                                                                                                                                                                                                                                                                                                                              |
| Line current                       | 66.4 A for 240 V<br>80.4 A for 200 V                                                                                                                                                                                                                                                                                                               |
| Speed range                        | 1...10                                                                                                                                                                                                                                                                                                                                             |
| Transient overtorque               | 120 % of nominal motor torque +/- 10 % for 60 s                                                                                                                                                                                                                                                                                                    |
| Asynchronous motor control profile | Constant voltage/frequency ratio<br>Current flux vector control (FVC) without speed feedback<br>Energy saving ratio<br>Quadratic voltage/frequency ratio<br>Constant voltage/frequency ratio with automatic IR compensation                                                                                                                        |
| Communication port protocol        | Modbus                                                                                                                                                                                                                                                                                                                                             |
| Type of polarization               | No impedance                                                                                                                                                                                                                                                                                                                                       |
| IP degree of protection            | IP20 on upper part without blanking plate on cover conforming to EN/IEC 60529<br>IP20 on upper part without blanking plate on cover conforming to EN/IEC 61800-5-1<br>IP21 conforming to EN/IEC 60529<br>IP21 conforming to EN/IEC 61800-5-1<br>IP41 on upper part conforming to EN/IEC 60529<br>IP41 on upper part conforming to EN/IEC 61800-5-1 |
| Option card                        | APOGEE FLN communication card<br>BACnet communication card<br>LonWorks communication card<br>METASYS N2 communication card                                                                                                                                                                                                                         |

## Complementary

|                                          |                                                                                    |
|------------------------------------------|------------------------------------------------------------------------------------|
| Power supply voltage limits              | 170...264 V                                                                        |
| Power supply frequency                   | 50...60 Hz (- 5...5 %)                                                             |
| Power supply frequency limits            | 47.5...63 Hz                                                                       |
| Apparent power                           | 33.5 kVA for 240 V                                                                 |
| Maximum prospective line I <sub>sc</sub> | 22 kA                                                                              |
| Maximum continuous output current        | 88 A at 230 V                                                                      |
| Maximum transient current                | 96.8 A for 60 s                                                                    |
| Speed drive output frequency             | 0.5...200 Hz                                                                       |
| Nominal switching frequency              | 8 kHz                                                                              |
| Switching frequency                      | 6...16 kHz adjustable<br>8...16 kHz with derating                                  |
| Speed accuracy                           | +/- 10 % of nominal slip for 0.2 T <sub>n</sub> to T <sub>n</sub> torque variation |

|                                                        |                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Torque accuracy                                        | +/- 15 %                                                                                                                                                                                                                                                                                                                                                                 |
| Regulation loop                                        | Adjustable PI regulator                                                                                                                                                                                                                                                                                                                                                  |
| Motor slip compensation                                | Adjustable<br>Automatic whatever the load<br>Not available in voltage/frequency ratio motor control                                                                                                                                                                                                                                                                      |
| Diagnostic                                             | 1 LED red for DC bus energized                                                                                                                                                                                                                                                                                                                                           |
| Output voltage                                         | <= power supply voltage                                                                                                                                                                                                                                                                                                                                                  |
| Insulation                                             | Electrical between power and control                                                                                                                                                                                                                                                                                                                                     |
| Recommended type of cable for mounting in an enclosure | With UL Type 1 kit: 3-strand UL 508 cable at 40 °C, copper 75 °C PVC<br>Without mounting kit: 1-strand IEC cable at 45 °C, copper 70 °C PVC<br>Without mounting kit: 1-strand IEC cable at 45 °C, copper 90 °C XLPE/EPR                                                                                                                                                  |
| Electrical connection                                  | L1/R, L2/S, L3/T terminal 50 mm <sup>2</sup> / AWG 1/0<br>VIA, VIB, FM, FLA, FLB, FLC, RY, RC, F, R, RES terminal 2.5 mm <sup>2</sup> / AWG 14                                                                                                                                                                                                                           |
| Tightening torque                                      | L1/R, L2/S, L3/T 24 N.m / 212 lb.in<br>VIA, VIB, FM, FLA, FLB, FLC, RY, RC, F, R, RES 0.6 N.m                                                                                                                                                                                                                                                                            |
| Supply                                                 | Internal supply at 24 V DC, voltage limits 21...27 V <= 200 mA for overload and short-circuit protection<br>Internal supply for reference potentiometer (1 to 10 kOhm) at 10.5 V DC, tolerance +/- 5 % <= 10 mA for overload and short-circuit protection                                                                                                                |
| Analogue input number                                  | 2                                                                                                                                                                                                                                                                                                                                                                        |
| Analogue input type                                    | VIA switch-configurable current 0...20 mA, impedance 242 Ohm, resolution 11 bits<br>VIA switch-configurable voltage 0...10 V DC, input voltage 24 V max, impedance 30000 Ohm, resolution 11 bits<br>VIB configurable PTC probe 0...6 probes, impedance 1500 Ohm<br>VIB configurable voltage 0...10 V DC, input voltage 24 V max, impedance 30000 Ohm, resolution 11 bits |
| Sampling duration                                      | F 2 ms +/- 0.5 ms for discrete input(s)<br>R 2 ms +/- 0.5 ms for discrete input(s)<br>RES 2 ms +/- 0.5 ms for discrete input(s)<br>VIA 2 ms +/- 0.5 ms for analog input(s)<br>VIB 2 ms +/- 0.5 ms for analog input(s)                                                                                                                                                    |
| Response time                                          | FLA, FLC 7 ms +/- 0.5 ms for discrete output(s)<br>FLB, FLC 7 ms +/- 0.5 ms for discrete output(s)<br>FM 2 ms +/- 0.5 ms for analog output(s)<br>RY, RC 7 ms +/- 0.5 ms for discrete output(s)                                                                                                                                                                           |
| Accuracy                                               | FM +/- 1 % for a temperature variation 60 °C<br>VIA +/- 0.6 % for a temperature variation 60 °C<br>VIB +/- 0.6 % for a temperature variation 60 °C                                                                                                                                                                                                                       |
| Linearity error                                        | FM +/- 0.2 % for output<br>VIA +/- 0.15 % of maximum value for input<br>VIB +/- 0.15 % of maximum value for input                                                                                                                                                                                                                                                        |
| Analogue output number                                 | 1                                                                                                                                                                                                                                                                                                                                                                        |
| Analogue output type                                   | FM switch-configurable current 0...20 mA, impedance 500 Ohm, resolution 10 bits<br>FM switch-configurable voltage 0...10 V DC, impedance 470 Ohm, resolution 10 bits                                                                                                                                                                                                     |
| Discrete output number                                 | 2                                                                                                                                                                                                                                                                                                                                                                        |
| Discrete output type                                   | FLA, FLC configurable relay logic NO, electrical service life 100000 cycles<br>FLB, FLC configurable relay logic NC, electrical service life 100000 cycles<br>RY, RC configurable relay logic NO, electrical service life 100000 cycles                                                                                                                                  |
| Minimum switching current                              | Configurable relay logic 3 mA at 24 V DC                                                                                                                                                                                                                                                                                                                                 |
| Maximum switching current                              | FL, R on inductive load, 2 A at 250 V AC, cos phi = 0.4, L/R = 7 ms<br>FL, R on inductive load, 2 A at 30 V DC, cos phi = 0.4, L/R = 7 ms<br>FL, R on resistive load, 5 A at 250 V AC, cos phi = 1, L/R = 0 ms<br>FL, R on resistive load, 5 A at 30 V DC, cos phi = 1, L/R = 0 ms                                                                                       |
| Discrete input type                                    | F programmable 24 V DC, with level 1 PLC, impedance 3500 Ohm<br>R programmable 24 V DC, with level 1 PLC, impedance 3500 Ohm<br>RES programmable 24 V DC, with level 1 PLC, impedance 3500 Ohm                                                                                                                                                                           |
| Discrete input logic                                   | F, R, RES negative logic (sink), state 0 >= 16 V, state 1 <= 10 V<br>F, R, RES positive logic (source), state 0 <= 5 V, state 1 >= 11 V                                                                                                                                                                                                                                  |
| Acceleration and deceleration ramps                    | Automatic based on the load<br>Linear adjustable separately from 0.01 to 3200 s                                                                                                                                                                                                                                                                                          |
| Braking to standstill                                  | By DC injection                                                                                                                                                                                                                                                                                                                                                          |

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protection type       | Drive against exceeding limit speed<br>Drive against input phase loss<br>Drive break on the control circuit<br>Drive input phase breaks<br>Drive line supply overvoltage and undervoltage<br>Drive line supply undervoltage<br>Drive overcurrent between output phases and earth<br>Drive overheating protection<br>Drive overvoltages on the DC bus<br>Drive short-circuit between motor phases<br>Drive thermal power stage<br>Motor motor phase break<br>Motor thermal protection<br>Motor with PTC probes |
| Insulation resistance | >= 1 MOhm at 500 V DC for 1 minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Frequency resolution  | Analog input 0.024/50 Hz<br>Display unit 0.1 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Connector type        | 1 RJ45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Physical interface    | 2-wire RS 485                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Transmission frame    | RTU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Transmission rate     | 9600 bps or 19200 bps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Data format           | 8 bits, 1 stop, odd even or no configurable parity                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Number of addresses   | 1...247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Communication service | Monitoring inhabitable<br>Read device identification (43)<br>Read holding registers (03) 2 words maximum<br>Time out setting from 0.1 to 100 s<br>Write multiple registers (16) 2 words maximum<br>Write single register (06)                                                                                                                                                                                                                                                                                 |
| Marking               | CE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Operating position    | Vertical +/- 10 degree                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Height                | 420 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Width                 | 240 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Depth                 | 122 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Product weight        | 27.4 kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## Environment

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise level                   | 59.9 dB conforming to 86/188/EEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Dielectric strength           | 2830 V DC between earth and power terminals<br>4230 V DC between control and power terminals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Electromagnetic compatibility | 1.2/50 µs - 8/20 µs surge immunity test IEC 61000-4-5 level 3<br>Conducted radio-frequency immunity test conforming to IEC 61000-4-6 level 3<br>Electrical fast transient/burst immunity test conforming to IEC 61000-4-4 level 4<br>Electrostatic discharge immunity test conforming to IEC 61000-4-2 level 3<br>Radiated radio-frequency electromagnetic field immunity test conforming to IEC 61000-4-3 level 3<br>Voltage dips and interruptions immunity test conforming to IEC 61000-4-11                                                                                           |
| Standards                     | EN 61800-3<br>EN 61800-3 environments 1 category C1<br>EN 61800-3 environments 1 category C2<br>EN 61800-3 environments 1 category C3<br>EN 61800-3 environments 2 category C1<br>EN 61800-3 environments 2 category C2<br>EN 61800-3 environments 2 category C3<br>EN 61800-5-1<br>IEC 61800-3<br>IEC 61800-3 environments 1 category C1<br>IEC 61800-3 environments 1 category C2<br>IEC 61800-3 environments 1 category C3<br>IEC 61800-3 environments 2 category C1<br>IEC 61800-3 environments 2 category C2<br>IEC 61800-3 environments 2 category C3<br>IEC 61800-5-1<br>UL Type 1 |
| Product certifications        | CSA<br>C-Tick<br>NOM 117<br>UL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Vibration resistance          | 1 gn (f = 13...200 Hz) conforming to EN/IEC 60068-2-8<br>1.5 mm (f = 3...13 Hz) conforming to EN/IEC 60068-2-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                                       |                                                                                                                          |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Shock resistance                      | 15 gn for 11 ms conforming to IEC 60068-2-27                                                                             |
| Pollution degree                      | 3 conforming to IEC 61800-5-1                                                                                            |
| Environmental characteristic          | Classes 3C1 conforming to IEC 60721-3-3<br>Classes 3S2 conforming to IEC 60721-3-3                                       |
| Relative humidity                     | 5...95 % without condensation conforming to IEC 60068-2-3<br>5...95 % without dripping water conforming to IEC 60068-2-3 |
| Ambient air temperature for operation | > 50 °C with derating<br>-10...40 °C without derating                                                                    |
| Ambient air temperature for storage   | -25...70 °C                                                                                                              |
| Operating altitude                    | <= 2000 m<br>1000...3000 m limited to 2000 m for the Corner Grounded distribution network                                |
| RoHS EUR status                       | Compliant                                                                                                                |
| RoHS EUR conformity date              | 1006                                                                                                                     |