Altivar 212 & S-Flex enclosed variable speed drives
for 3-Phase asynchronous motors from 1 to 100 hp, 0.75 to 75 kW

eCatalog
2014
Altivar 212 &
S-Flex enclosed
variable speed drives

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S-Flex enclosed variable speed drives
## Altivar 212
### variable speed drives

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**Introduction**

The Altivar™ 212 drive is a frequency inverter for 1-100 HP, 0.75-75 kW three-phase asynchronous motors.

It has been designed for the most common HVAC (Heating, Ventilation and Air Conditioning) systems.

Its design is based on eco-energy with a reduction in energy consumption of up to 70% compared to a conventional control system.

It is eco-friendly and complies with directives such as RoHS, WEEE, etc. relating to environmental protection.

The Altivar 212 is operational from the moment the power is turned on; it can be used to achieve your building’s maximum energy efficiency.

**Applications**

- **Ventilation**
- **Heating & Air Conditioning**
- **Pumping**

**Optimization of building management**

The Altivar 212 drive considerably improves building management by:

- Simplifying circuits by removing flow control valves and dampers,
- Offering flexibility and ease of adjustment for installations, thanks to its compatibility with building management system connectivity
- Reducing noise pollution (noise caused by air flow and motor)

Its various standard versions make it possible to reduce installation costs by integrating EMC filters, categories C1 to C3 depending on the model, which has the following advantages:

- Compact size
- Simplified wiring

The Altivar 212 offers a range of power supply options to meet different needs.

**Compliance with international standards & certifications**

The Altivar 212 conforms to international standards and is in accordance with recommendations relating to electrical industrial control devices, including the Low Voltage Directive and IEC/EN 61800-3 (immunity and conducted and radiated EMC emissions).

The entire range has obtained CE marking according to the European Low Voltage (2006/95/EC) and EMC (2004/108/EC) Directives. The range is UL 508C, CSA, C-Tick and NOM certified.

**Flexible communication adapted to building management**

The Altivar 212 drive is easily adapted to building management systems thanks to its numerous functions and communication protocols integrated as standard: Modbus, METASYS N2®, APOGEE FLN P1 and BACnet®. With these protocols offered as standard and the LonWorks® communication card offered as an option, the Altivar 212 drive is optimized for the building market (HVAC).

**Quick and easy dialogue to make your installations easier to use**

Numerous programming tools are also included in the Altivar 212 offer, making installations quick, easy and cost-effective.

**Introduction**

The Altivar 212 range of variable speed drives extends across a range of motor power ratings from 1 HP to 100 HP, 0.75 kW to 75 kW with the following types of power supply:

- 200…240 V three-phase, 1 HP to 40 HP, 0.75 kW to 30 kW, IP 21
- ATV 212H075M3X
- ATV 212W075N4
- ATV 212W075N4

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- Compact size
- Simplified wiring

The Altivar 212 offer helps to reduce equipment costs while optimizing its performance.

**Compliance with electromagnetic compatibility (EMC) requirements for the protection of equipment**

The built-in EMC filters in ATV 212H075M3X and ATV 212W075N4 drives and compliance with EMC requirements simplify installation and provide a very economical means of ensuring devices meet the criteria to receive the CE mark.

The EMC filters can be used to meet the requirements of the IEC/EN 61800-3, category C2 or C3 for ATV 212H075M3X, category C1 for ATV 212W075N4.

**Innovative technology for managing harmonics**

Thanks to its Reduced Harmonic Technology (RHT), the Altivar 212 drive offers immediate, disturbance-free operation. This technology avoids having to resort to additional options such as a line choke or DC choke to deal with current harmonics. This makes it possible to obtain a THDI of less than 35%, a much lower value than the 48% level of THDI imposed by standard IEC/EN 61000-3-12.

With the Altivar 212 range, you avoid the cost of adding a line choke or DC choke, you reduce the time spent on wiring, you optimize the enclosure size and you reduce the losses.

This technology can also triple the service life of the DC capacitors.

**Better management of motor disturbance**

The Altivar 212 range offers optional motor chokes which can increase the maximum cable lengths between the drive and the motor and limit disturbances at the motor terminals.
Altivar 212 variable speed drives

Introduction

The Altivar™ 212 drive is a frequency inverter for 1-100 HP, 0.75-75 kW three-phase asynchronous motors.

It has been designed for the most common HVAC (Heating, Ventilation and Air Conditioning) systems. Its design is based on eco-energy with a reduction in energy consumption of up to 70% compared to a conventional control system.

It is eco-friendly and complies with directives such as RoHS, WEEE, etc. relating to environmental protection.

The Altivar 212 is operational from the moment the power is turned on; it can be used to achieve your building’s maximum energy efficiency.

Applications

- **Ventilation**
  - Optimization of building management
  - Thanks to its small design, fitting it into the ventilation system is simple and fast.
  - With the Altivar 212 drives, ventilation systems can achieve a higher level of energy efficiency.

- **Heating & Air conditioning**
  - Quick and easy dialogue to make your installations easier to use
  - Numerous programming tools are also included in the Altivar 212 offer, making installations quick, easy and cost-effective.

- **Pumping**
  - The Altivar 212 drives are compact IP 21 or UL Type 12/IP 55 products which meet electromagnetic compatibility requirements and reduce current harmonics, causing minimal temperature rise in the cables.

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The Altivar™ 212 drive is a frequency inverter for 1-100 HP, 0.75-75 kW three-phase asynchronous motors.

It has been designed for the most common HVAC (Heating, Ventilation and Air Conditioning) systems. Its design is based on eco-energy with a reduction in energy consumption of up to 70% compared to a conventional control system.

It is eco-friendly and complies with directives such as RoHS, WEEE, etc. relating to environmental protection.

The Altivar 212 is operational from the moment the power is turned on; it can be used to achieve your building’s maximum energy efficiency.

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The entire range has obtained CE marking according to the European Low Voltage (2006/95/EC) and EMC (2004/108/EC) Directives. The range is UL 508C, CSA, C-Tick and NOM certified.

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With these protocols offered as standard and the LonWorks® communication card offered as an option, the Altivar 212 drive is optimized for the building market (HVAC).

Better management of motor disturbance

The Altivar 212 offers optional motor chokes which can increase the maximum cable lengths between the drive and the motor and limit disturbances at the motor terminals.
Altivar 212 variable speed drives

Introduction

Product

The compact nature of the Altivar 212 range simplifies installation and reduces costs by optimizing the size of enclosures (whether floor-standing or wall-mounted).

Altivar 212 drives can be mounted in a variety of ways to adapt to the needs of an installation. They can be mounted side by side, and can also be wall-mounted in compliance with UL Type 1 requirements using kits VW3A3181p and VW3A920p.

They are designed to operate in an enclosure at an ambient temperature of +40°C or +50°C depending on the model, without derating, or from +50°C or +60°C depending on the model, with derating.

The Altivar 212 drive includes 3 logic inputs, 2 analog inputs, 1 analog output and 2 relay outputs (with 1 NO and 1 NO/NC contacts). It also includes an integrated 4 digit, 7 segment LED display with 7 button keypad, as well as RS485 Modbus™ port, plus a 4 screw removable terminal block for software selectable BACnet, Modbus, METASYS N2 or APOGEE P1 communication protocols. LonWorks is available in an option card.

Numerous configuration tools

The Altivar 212 range offers a wide range of dialogue and configuration tools that make it quick, easy and cost-effective to install.

1. LCD Keypad

The Altivar 212 drive can be used with the remote graphic display keypad, common to all Schneider Electric’s variable speed drive ranges. This keypad is very user-friendly when performing startup and maintenance operations thanks to its full text screen, online help screens and text in the user’s language (6 factory-installed languages available).

It can be remotely mounted on an enclosure door with IP 54 or IP 65 degree of protection.

2. SoMove software

SoMove software is a PC based application. It can be used to edit the Altivar 212 drive parameters, save configurations, import them from a PC and export them to a PC.

3. Multi-Loader configuration tool

The Multi-Loader tool enables configurations to be copied from a PC or a drive and duplicated on another drive. The Altivar 212 drives must be powered up.

4. Quick menu tool

The Altivar 212 drive offers a quick setup function in the form of its Quick menu, which includes the 10 key installation parameters (acceleration, deceleration, motor parameters, etc.).

5. Free iPad® app

The Altivar 212 drive can be connected directly to an iPad with optional 30-pin mobile to RS485 with RJ45 connector converter cable (model VW3A8151R20U).

Example of dialogue and configuration tools associated with the Altivar 212 range

Introduction

Functions

Dedicated functions for ventilation applications

- Noise reduction due to the switching frequency, which is adjustable up to 16 kHz during operation
- Automatic catching of a spinning load with speed detection
- Adaptation of current limiting according to speed
- Reference calibration and limitation

Protection functions

- Smoke purge system (forced operation with fault inhibition)
- Damper control with end switch interlock
- Machine protection via skip frequency function (resonance suppression).

Dedicated functions for pumping applications

- Sleep/wake up

Protection functions

- Protection against overloads and overcurrents in continuous operation (pump jamming)
- Machine mechanical protection with control of operating direction
- Protection of the installation by means of underload and overload detection

Universal functions designed specifically for building applications

- Energy saving ratio
- Auto-tuning
- Integrated PID regulator with preset references and automatic/manual (Auto/Man.) mode
- Automatic ramp adaptation, ramp switching, ramp profile
- Switching between sets of meter rating data (Multimotor)
- Switching of references and run command using the LOC/REM key
- Preset speeds
- Monitoring, measurement of energy consumption kWh and elapsed run time meters

Protection functions

- Motor and drive thermal protection, via a built-in PTC thermistor probe
- Protection via management of multiple detected faults and configurable alarms
Altivar 212 variable speed drives

Introduction

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1. LCD Keypad
   - The Altivar 212 drive (1) can be used with the remote graphic display keypad, common to all Schneider Electric’s variable speed drive ranges.
   - This keypad is very user-friendly when performing startup and maintenance operations thanks to its full-text screen, online help screens and text in the user’s language (6 factory-installed languages available).
   - It can be remotely mounted on an enclosure door with IP 54 or IP 65 degree of protection.

2. SoMove software
   - SoMove software is a PC based application. It can be used to edit the Altivar 212 drive parameters, save configurations, import them from a PC and export them to a PC.

3. Multi-Loader configuration tool
   - The Multi-Loader tool enables configurations to be copied from a PC or a drive and duplicated on another drive. The Altivar 212 drives must be powered up.

4. Quick menu tool
   - The Altivar 212 drive offers a quick setup function in the form of its Quick menu, which includes the 10 key installation parameters (acceleration, deceleration, motor parameters, etc.).

5. Free iPad® app
   - The Altivar 212 drive can be connected directly to an iPad with optional 30-pin mobile to RS485 with RJ45 connector converter cable (model VW3A8151R20).

Example of dialogue and configuration tools associated with the Altivar 212 range

Altivar 212 variable speed drives

Introduction

Functions

Dedicated functions for ventilation applications

- Noise reduction due to the switching frequency, which is adjustable up to 16 kHZ during operation
- Automatic catching of a spinning load with speed detection
- Adaptation of current limiting according to speed
- Reference calibration and limitation

Protection functions

- Smoke purge system (forced operation with fault inhibition)
- Damper control with end switch interlock
- Machine protection via skip frequency function (resonance suppression).

Dedicated functions for pumping applications

- Sleep/wake-up

Protection functions

- Protection against overloads and overcurrents in continuous operation (pump jamming)
- Machine mechanical protection with control of operating direction
- Protection of the installation by means of underload and overload detection

Universal functions designed specifically for building applications

- Energy saving ratio
- Auto-tuning
- Integrated PID regulator with preset references and automatic/manual (Auto/Man.) mode
- Automatic ramp adaptation, ramp switching, ramp profile
- Switching between sets of motor rating data (Multimotor)
- Switching of references and run command using the LOC/REM key
- Preset speeds
- Monitoring, measurement of energy consumption kWh and elapsed run time meters

Protection functions

- Motor and drive thermal protection, via a built-in PTC thermistor probe
- Protection via management of multiple detected faults and configurable alarms

Example of an application requiring the use of dedicated building functions

Example of dialogue and configuration tools associated with the Altivar 212 range
## Electrical & Environmental Specifications

### Electrical Specifications

| Input Power | Voltage | V | 200 - 15% to 240 + 10% three-phase for drives ATV212|seeM3X | ATV212|seeH4, |WseeH4, |WseeC4C |
|-------------|---------|---|--------------------------------------------------|--------|--------|----------|----------|
| Frequency   | Hz      |   | 50 - 60 ± 5%                                      |        |        |          |          |
| Drive output voltages | V | 200 - 380 three-phase for drives ATV212|seeM3X | ATV212|seeH4, |WseeH4, |WseeC4C |
| Output frequency range | Hz | 50 - 60 ± 5% | 200 - 380 three-phase for drives ATV212|seeM3X | ATV212|seeH4, |WseeH4, |WseeC4C |
| Configurable switching frequency | kHz | 12 kHz up to ATV212|seeM3X and up to ATV212|seeH4H4 | 12 kHz | 12 kHz | 12 kHz |

### Environmental Specifications

- **Vibration resistance**: Drive not bolt mounted. According to IEC60068-2-6:
  - 1.5 mm peak from 5 to 13 Hz.
  - 1.5 mm from 15 to 200 Hz.
- **Shock resistance**: 16 g for 1 ms conforming to EN60068-2-27.
- **Maximum ambient pollution**: Definition of insulation:
  - 1 HP to 25 HP @ 208/240 V, 1 HP to 5 HP @ 380/480 V:
    - Pollution degree 2 per IEC61800-5-1.
  - 30 HP to 40 HP @ 208/240 V, 30 HP to 100 HP @ 380/480 V:
    - Pollution degree 3 per IEC61800-5-1.
- **Environmental conditions use**:
  - IEC 60721-3-3 classes 3C1 and 3C2.
- **Ambient temperature**:
  - Operation: 85°F to 104°F (30°C to 40°C) operational without derating, up to 122°F (50°C) without derating. Refer to the Installation Manual for derating curves for each Altivar 212 drive.
  - Storage: ATV212|seeM3X:
    - 13°F to 108°F (-25°C to 40°C).
- **Maximum operating altitude**: Up to 3,300 ft (1,000 m) without derating, derate nominal current by 1% for each additional 330 ft (100 m) up to 10,000 ft (3,000 m) and to 2,000 ft (600 m) if supplied by a common grounded distribution system.
- **Operating position**: Maximum permanent angle in relation to the normal vertical mounting position.
Altivar 212
variable speed drives
Specifications
Electrical & Environmental

**Electrical Specifications**

**Input power**
- Voltage: V
- Frequency: Hz

**Drive output voltages**
- V: 200...240 three-phase for drives ATV212H

**Frequency**
- Hz: 50...60 ± 5%

**Input power**
- Range: 1 HP to 25 HP @ 200/240 V, 1 HP to 5 HP @ 380/480 V

**Output frequency range**
- Hz: 0.5...200

**Configurable switching frequency**
- kHz: The switching frequency can be set between 6 and 16 kHz for all ratings.

**Maximum ambient pollution**
- Degree of protection: ATV212H range: C1

**Drive noise level**
- dBA: 54 dB conforming to 86/188/EEC

**Vibration resistance**
- Drive not DIN rail mounted: According to IEC60068-2-6:
  - 1.5 mm peak from 3 to 13 Hz
  - 1 g (rms) from 15 to 200 Hz

**Shock resistance**
- 1 g for 11 ms conforming to EN60068-2-27

**Maximum ambient temperature**
- Operation: 30 °C to 54 °C (50 °C to 126 °F) operational, up to 122 °F (50 °C) with derating. See Installation Manual for derating.

**Maximum ambient altitude**
- Up to 3,300 ft (1,000 m) without derating, derate nominal current by 1% for each additional 1,300 ft (400 m) up to 10,000 ft (3,000 m) and up to 6,600 ft (2,000 m) if supplied by corner grounded distribution system

**Environmental Specifications**

**Certifications and Compliance**

**Conformity to standards**
- Altivar 212 drives have been developed to conform to international standards and the recommendations relating to electrical industrial control equipment (IEC, EN), in particular: IECEN61000-3-2, IEC61800-3-2, IEC61800-5-1.

**EMC Immunity**
- Conducted radio-frequency immunity test level 3 conforming to IEC61000-4-6
- Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC61000-4-3
- Voltage dips and interruptions immunity test conforming to IEC61000-4-11
- 1.250 μs - 8/20 μs surge immunity test level 3 IEC61000-4-5
- Electrical fast transient/burst immunity test level 4 conforming to IEC61000-4-4
- Electrostatic discharge immunity test level 3 conforming to IEC61000-4-2

**Conducted & Radiated EMC emissions for drives**
- ATV212H range: Integrated Class 2 EMC filter for radiated and conducted emissions, IEC61800-3, category C2 and C3
- ATV212H range: Integrated Class 2 EMC filter for radiated and conducted emissions, IEC61800-3, category C2 and C3
- ATV212H range: No integrated EMC filter (use optional filters to reduce emission levels)

**CC marking**
- The drives are marked CE according to the European low voltage (2006/95/EC) and EMC (2004/108/EC) directives

**Product certifications**
- UL File E116975, CSA C22.7/406, UL508C, Plenum rated under UL508C for UL1995 installations. C-Tick, NOM 117, CE marked

**Degree of protection**
- ATV212 range: IP20. Conformal coating per IEC60721-3-3 classes 3C2 and 3S2. Type 1 with optional conduit entrance kit
- ATV212W range: Type 129P55. Conformal coating per IEC60721-3-3 classes 3C2 and 3S2

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[Schneider Electric Logo]

**Schneider Electric**

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Altivar 212 variable speed drives

Specifications

I/O & Control

I/O and Control Specifications

Available internal supplies

- 24 Vdc supply max. 23 W, max. 27 Vdc, maximum current: 200 mA

Configurable Analog input

- Voltage analog input, configurable as an analog input or as a PTC probe input
- Voltage analog input:
  - 0–10 Vdc, maximum load impedance: 30 kΩ max. voltage: 24 Vdc
  - Max. sampling time: 2.2 ms ± 0.5 ms
  - Resolution: 10 bits
  - Accuracy: ±0.6% for a temperature variation of 140 °F (60 °C)
  - Linearity: ±0.15% of the maximum value
  - PTC probe input:
    - 6 probes max. mounted in series
    - Nominal value: 1.5 kW
    - Trip resistance: 0.3 kW, reset value: 0.5 kW
  - Short-circuit detection threshold: < 50 W
  - Maximum response time: 7 ms ± 0.5 ms

Configurable Analog output

- 1 switch-configurable (SWI615) voltage or current analog output:
  - Voltage analog output 0–10 Vdc, minimum load impedance: 7.62 kΩ
  - Current analog output X–Y mA by programming X and Y from 0 to 20 mA, maximum load impedance: 970 Ω
  - Maximum sampling time: 2 ms ± 0.5 ms
  - Resolution: 10 bits
  - Accuracy: ±1% for a temperature variation of 140 °F (60 °C)
  - Linearity: ±0.2%

Configurable Relay output

- 3 programmable logic inputs, 24 Vdc, compatible with level 1 PLC, IEC 61508 standard
- Impedance: 4.7 kΩ
- Maximum voltage: 30 Vdc
- Max. sampling time: 2 ms ± 0.5 ms
- Multiple assignment makes it possible to configure several functions on one input

Positive logic (Source): State 0 if \( v \leq 0.4 \text{ Vdc} \) or logic input not wired, state 1 if \( v > 11 \text{ Vdc} \)

Negative logic (Sink): State 0 if \( v \geq 4.5 \text{ Vdc} \) or logic input not wired, state 1 if \( v < 3.5 \text{ Vdc} \)

U logic inputs

- F, R, RES

- 3 programmable logic inputs, 24 Vdc, compatible with level 1 PLC, IEC 61508 standard
- Impedance: 4.7 kΩ
- Maximum voltage: 30 Vdc
- Max. sampling time: 2 ms ± 0.5 ms
- Multiple assignment makes it possible to configure several functions on one input

Positive logic (Source): State 0 if \( v \leq 0.4 \text{ Vdc} \) or logic input not wired, state 1 if \( v > 11 \text{ Vdc} \)

Negative logic (Sink): State 0 if \( v \geq 4.5 \text{ Vdc} \) or logic input not wired, state 1 if \( v < 3.5 \text{ Vdc} \)

Configurable Analog/Logic output

- Switch-configurable voltage or current analog input:
- Voltage analog input: 0–10 Vdc, impedance 30 kΩ maximum voltage: 24 Vdc
- Analog current input: X–Y mA by programming X and Y from 0 to 30 mA, impedance: 250 Ω
- Max. sampling time: 3.5 ms ± 0.5 ms
- Resolution: 10 bits
- Accuracy: ±0.8% for a temperature variation of 140 °F (60 °C)
- Linearity: ±0.15% of the maximum value

*This analog input is also configurable as a logic input. Consult the Altivar 212 Programming Manual for more information.

Short-circuit and overload protection:

- P24

VIB Voltage analog input, configurable as an analog input or as a PTC probe input.

RYA, RYC 1 relay logic output, 1 N/O contact

FLA, FLB, FLC 1 relay logic output, 1 N/O contact, and 1 N/C contact with common point

3 programmable logic inputs, 24 Vdc, compatible with level 1 PLC, IEC 65A-68 standard

VIA

Communications

- Via the on-board interface or remote display terminal or SoMove setup software:
  - Modbus
  - BACnet
  - Metasys N2
  - Niagara 4

Diagnostics

- Via the on-board interface or remote display terminal or SoMove setup software:
  - FLUSH port for remote keystaped connection
  - Multi-loader
  - PC software
  - Bluetooth dongle

Manual for more information.

*This analog input is also configurable as a logic input. Consult the Altivar 212 Programming Manual for more information.

Altivar 212 variable speed drives

Specifications

I/O & Control

I/O and Control Specifications (continued)

Protocol

- Modbus

Structure

- 1 RJ45 connector

Physical interface

- Ethernet RJ45 (10/100 Base-T)

Transmission mode

- RJ45

Transmission speed

- Configurable via the Human-Machine interface, remote graphic display keypad or SoMove setup software:
  - 4800 bps, 9600 bps, 19200 bps or 38400 bps

Number of subscribers

- 25 maximum

Polarization

- No polarization impedance. This must be provided by the wiring system (for example, in the master)

Address

- 1 to 247, configurable via the Human-Machine interface, remote display terminal or SoMove setup software

Screw Terminals

- 0.2 to 1 mm² (AWG 24 to 16)

Ramp profile:

- Linear from 0 to 3000 s
- 5 ramp
- 1.2 ramp

Automatic adaptation of deceleration ramp time if braking capacities exceeded, although this adaptation can be disabled (see braking unit)

Internal braking

- By DC injection automatically as soon as the estimated output frequency drops to < 0.2 Hz, periodic adjustable from 0.1 to 30 s or continuous, current adjustable from 0.1 to 1.2 Hz

Main drive protection features

- Thermal protection against overheating
- Overcurrent protection between motor phases
- Overcurrent protection between motor phases and ground protection in the event of line overvoltage and undervoltage
- Input phase loss protection, in three-phase

Motor protection

- Class 10 thermal protection integrated in the drive by continuous calculation of the Kt

Frequency resolution

- Display unit: 0.1 Hz
- Analog input: 10 kHz AD converter

Response time on a change of setpoint

- 20 ms ± 0.5 ms (VIB) – analog input(s)
- 3.5 ms ± 0.5 ms (VIB) – analog input(s)
- 2 ms ± 0.5 ms (R, RES) – discrete input(s)
- 2 ms ± 0.5 ms (F) – discrete input(s)
I/O and Control Specifications (continued)

Protocol
- Modbus
- Canopen
- EtherCAT
- DeviceNet
- PROFINET
- OPC-UA

Structure
- 1 N/A connector

Physical interface
- 2-wire RS 485

Transmission mode
- RTU

Transmission speed
- Configurable via the Human-Machine interface, remote graphic display keypad or SoftMove setup software: 4800 bps, 9600 bps, 19200 bps or 38400 bps

Number of subscribers
- 31 maximum

Power supply
- No isolation: This must be provided by the wiring system (for example, in the meter)

Address
- 1 to 247, configurable via the Human-Machine interface, remote display terminal or SoftMove setup software

Communications
- Multi-driver
- RS-422
- Bluetooth dongle

Embedded four-screw removable terminal for dsy chain connection for these communication networks:
- Modbus
- CANopen
- Modbus
- Apogee P1

DIagnostics
- Via the on-board interface or remote graphic display keypad

On display unit:
- 4 digit, 7 segment LED display

Maximum I/O wire size and tightening torque
- On inductive load (cos ϕ = 1): 3 A for 250 Vac or 30 Vdc
- On resistive load (cos ϕ = 1): 5 A for 250 Vac or 30 Vdc
- State 0 if L/R = 0.2 ms: 2 A for 250 Vac or 30 Vdc
- State 0 if L/R = 1 ms: 3 A for 250 Vac or 30 Vdc
- State 0 if L/R = 7 ms: 3 A for 250 Vac or 30 Vdc

Screw Terminals
- Wire size: 0.75 to 2.5 mm² (AWG 18 to 14)
- Linear from 0 to 3200 s
- U ramp
- S ramp

Spring Terminals
- Wire size: 0.2 to 1 mm² (AWG 24 to 16)
- Linear from 0 to 3200 s
- U ramp
- S ramp

Acceleration and deceleration ramps
- Ramp profile:
  - Linear from 0 to 3200 s
  - 5 x ramp
  - 16 ramp
- Automatic adaptation of deceleration ramp time if braking capacities exceeded, although this adaptation can be disabled (use of braking unit)

Internal braking
- By DC injection: automatically as soon as the estimated output frequency drops to < 0.2 Hz, period adjustable from 0.1 to 30 s or continuous, current adjustable from 0 to 1.2 Hz

Main drive protection features
- Thermal protection against overheating
- Protection against short-circuits between motor phases
- Overcurrent protection between motor phases and ground protection in the event of line overvoltage and undervoltage
- Input phase loss protection in three-phase

Motor protection
- Class 10 thermal protection integrated in the drive by continuous calculation of the PI

Frequency resolution
- Display unit: 0.1 Hz
- Analog inputs: 10-4 AD converter

Response time on a change of setpoint
- 25 ms ± 0.5 ms (VIB) - analog input(s)
- 3.5 ms ± 0.5 ms (VIB) - analog input(s)
- 2 ms ± 0.5 ms (RES) - discrete input(s)
- 2 ms ± 0.5 ms (R) - discrete input(s)
- 2 ms ± 0.5 ms (F) - discrete input(s)
Altivar 212
variable speed drives

Specifications

Additional Information

- Run command Input to drive by remote contact from the BAS. 24 vdc supplied by VFD
- Speed command Input to drive from the BAS. Typically a 2-10Vdc or 0-10 Vdc
- Run status Output contact from drive to the BAS. 1 N.O. contact on drive
- Speed feedback Analog output from drive to the BAS. Typically 0-10 Vdc, or assignable to motor values.
- Detected Fault Output contact from drive to the BAS. 1 N.O. & 1 N.C. contact on drive
- Loss of Speed Command to run at last speed or a pre-defined speed on loss of speed command

Automatic Restart Selectable configuration to automatically restart after cause of the detected fault is cleared
- Skip Frequency Bands Three Skip frequency settings with adjustable bandwidth to turn out resonating frequencies in piping or ductwork
- Local/Remote Control Keypad selectable: local keypad control for Run, Stop and speed control or from remote signal from BAS
- Catch on the fly configuration to initiate smooth start
- Broken Belt Detection Configuration to detect under load condition and initiate alarm
- PID Control Set point and feedback inputs for proportional, integral, and derivative control
- Smoke Purge Override Logic Input on the drive configured to run the motor at configured speed
- Pump Jam Management Configuration to manage blocked pump impellers
- Motor direction protection Configuration to avoid operation in reverse direction
- Power Line Motor Line supply Altivar 212
- IP 21 drives (frequency range from 0.5 to 200 Hz)

Typical Air Handling Applications

- HVAC supply and return fans
- Exhaust and ventilation fans
- HVAC supply and return fans
- Motor direction protection Configuration to avoid operation in reverse direction
- Pump Jam Management Configuration to manage blocked pump impellers

Harmonic Abatement

- Embedded reduced harmonic technology provides <3% THD at VFD input terminals, which is equivalent to a 2% line reactor or DC chokes.
- Efficiency Above 95%
- Power Factor Above 95% at full load

Additional Information

Integrated Fan and Pump Functionality

- H - IP21 product
- W - Type 12/IP32 product
- Dimensions (overall)

IP 21 drives (frequency range from 0.5 to 200 Hz)

<table>
<thead>
<tr>
<th>Power Line current(1)</th>
<th>Maximum prospective line lc</th>
<th>Maximum continuous output current (hp)(2)</th>
<th>Maximum transient current for 50 x Max. output current</th>
<th>Disipated power at maximum output current</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP kW</td>
<td>A</td>
<td>A</td>
<td>W</td>
<td>%</td>
</tr>
<tr>
<td>Three-phase supply voltage: 200…480 V 50/60 Hz, with EMC filter(3)</td>
<td>0.75</td>
<td>1.3</td>
<td>2.7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1.1</td>
<td>2.0</td>
<td>3.7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>2.7</td>
<td>3.5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.5</td>
<td>4.7</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>2.2</td>
<td>3.9</td>
<td>4.9</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2.5</td>
<td>4.4</td>
<td>5.4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5.2</td>
<td>6.0</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>3.5</td>
<td>5.7</td>
<td>6.6</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6.3</td>
<td>7.0</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>6.9</td>
<td>7.6</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>7.4</td>
<td>8.0</td>
<td>22</td>
</tr>
</tbody>
</table>

(1) Typical value for the indicated motor power and for the maximum prospective line Isc.
(2) Drives are supplied with an EMC plate, for customer assembly.
(3) Drives are supplied with an EMC plate, for customer assembly.
(4) With integrated C1 EMC filter for UL Type 12/IP55 products ATV212H18M3X
(5) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H075N4
(6) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H15N4
(7) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H150M4
(8) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H200M4
(9) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H225M4
(10) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H250M4
(11) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H300M4
(12) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H375M4
(13) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H450M4
(14) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H550M4
(15) with integrated C1 EMC filter for UL Type 12/IP55 products ATV212H690M4

EMC plate not mounted

- ATV 212 HD05N4
- ATV 212 HD10N4
- ATV 212 HD15N4
- ATV 212 HD22N4
- ATV 212 HD30N4
- ATV 212 HD45N4
- ATV 212 HD75N4
- ATV 212 HD110N4
- ATV 212 HD150N4
- ATV 212 HD180N4
- ATV 212 HD220N4
- ATV 212 HD250N4
- ATV 212 HD300N4
- ATV 212 HD375N4
- ATV 212 HD450N4
- ATV 212 HD550N4
- ATV 212 HD690N4

EMC plate mounted

- ATV 212 HD05M4
- ATV 212 HD10M4
- ATV 212 HD15M4
- ATV 212 HD22M4
- ATV 212 HD30M4
- ATV 212 HD45M4
- ATV 212 HD75M4
- ATV 212 HD110M4
- ATV 212 HD150M4
- ATV 212 HD180M4
- ATV 212 HD220M4
- ATV 212 HD250M4
- ATV 212 HD300M4
- ATV 212 HD375M4
- ATV 212 HD450M4
- ATV 212 HD550M4
- ATV 212 HD690M4

Part Number Explanation

- ATV212
- Product Family
- W - Type 12/IP32 product
- H - IP21 product
- MXX = 200 - 240 V three-phase
- N4C = 380 - 480 V three-phase

Additional Information

Selection Table

<table>
<thead>
<tr>
<th>Series</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075M4</td>
<td>IP 21 drives</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H110M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H150M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H200M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H225M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H250M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H300M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H375M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H450M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H550M4</td>
<td>Power Line current</td>
</tr>
<tr>
<td></td>
<td>ATV212H690M4</td>
<td>Power Line current</td>
</tr>
</tbody>
</table>

Dimensions (overall)

- Dimensions (overall)
Altivar 212 variable speed drives

Specifications

Additional Information

Integrated Fan and Pump Functionality
- Run command Input to drive by remote contact from the BAS. 24 vac supplied by VFD.
- Speed command Input to drive from the BAS: typically A-420Vac or 0-5Vdc.
- Run status Output contact from drive to the BAS: 1 N.O. contact on drive.
- Speed feedback Analog output to drive from the BAS: typically 0-420mAdc, or assignable to motor values.
- Detected Fault Output contact from drive to the BAS: 1 N.O. & 1 N.C. contact on drive.
- Loss of Speed Configuration to run at last speed or pre-defined speed on loss of speed command.
- Automatic Restart Selectable configuration to automatically restart after cause of the detected fault is cleared.
- Slip Frequency Bends Three skip-frequency settings with adjustable bandwidth to tune out resonating frequencies in piping or ductwork.
- Local/Remote Control Keypad selectable: local keypad control for Run, Stop and speed control or from remote signal from BAS.
- Catch on the fly configuration to initiate speed and direction change to provide smooth start of windmilling fans.
- Damper Control Relay Output on the drive to control damper opening sequence, and wait for feedback to start the motor.
- Smoke Pump (Overloads Logic Input) on the drive configured to run the motor at configured speed for forced ventilation.
- Broken Ball Detection/Configuration to detect under load condition and initiate alarm sequence.
- PID Control Set point and feedback inputs for proportional, integral, and derivative control.
- Sleep/Wakeup Configuration in the drive to stop the pump at low or no flow and re-start on demand for low flow.
- Pump Jam Management Configuration to manage blocked pump impeller.
- Motor direction protection/Configuration to avoid operation in reverse direction.

Typical Air Handling Applications
- HVAC supply and return fans.
- Exhaust and ventilation fans.
- Cooling tower fans.
- Energy recovery wheels.
- Typical pumping.

Harmonic Abatement
- Embedded reduced harmonic technology provides <3% THDI at VFD input terminals, which is equivalent to a 2% line reactor or DC choke.
- Power Factor Above 99%.
- Efficiency Above 95% at full load.

Additional Information

IP 21 drives (frequency range from 0.5 to 200 Hz)

<table>
<thead>
<tr>
<th>Part number</th>
<th>Frame size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H27</td>
<td>1200 W</td>
<td>27 kg</td>
</tr>
<tr>
<td>ATV212H27M3X</td>
<td>1200 W</td>
<td>27 kg</td>
</tr>
</tbody>
</table>

Efficiency
Above 96% at full load.

Above 99%

Above 99%

Above 99%

Above 99%

Above 99%

Above 99%

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Above 99%
## Altivar 212 variable speed drives

### UL Type 12/IP 55 drives

#### UL Type 12/IP 55 drives (frequency range from 0.5 to 200 Hz)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>380 V 400 V</td>
<td>ATV212W075N4</td>
<td>1.05</td>
<td>1.7 / 1.4</td>
<td>5</td>
<td>2.2 / 2.4</td>
<td>32.8</td>
<td>ATV212W075N4</td>
<td>9</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>ATV212W075N4C</td>
<td>1.05</td>
<td>1.7 / 1.4</td>
<td>5</td>
<td>2.2 / 2.4</td>
<td>32.8</td>
<td>ATV212W075N4C</td>
<td>9</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>ATV212W110N4</td>
<td>1.05</td>
<td>2.2 / 1.6</td>
<td>5</td>
<td>3.7 / 3.9</td>
<td>36.9</td>
<td>ATV212W110N4</td>
<td>10</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>ATV212W110N4C</td>
<td>1.05</td>
<td>2.2 / 1.6</td>
<td>5</td>
<td>3.7 / 3.9</td>
<td>36.9</td>
<td>ATV212W110N4C</td>
<td>10</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>ATV212W150N4</td>
<td>1.05</td>
<td>3.6 / 2.4</td>
<td>5</td>
<td>6.2 / 6.9</td>
<td>39.1</td>
<td>ATV212W150N4</td>
<td>11</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>ATV212W150N4C</td>
<td>1.05</td>
<td>3.6 / 2.4</td>
<td>5</td>
<td>6.2 / 6.9</td>
<td>39.1</td>
<td>ATV212W150N4C</td>
<td>11</td>
<td>11.4</td>
</tr>
</tbody>
</table>

**Note:**
- Max. continuous output current [A] for 50 s is the maximum continuous output current that the drive can handle for 50 seconds.
- THDi is the Total Harmonic Distortion Index, which measures the distortion of the output waveform.
- Frame size and weight are provided for each drive model.

### Three-phase supply voltage: 380...480 V 50/60 Hz, with integrated category C2 or C3 EMC filter

#### Altivar 212 Short Circuit Current Ratings

<table>
<thead>
<tr>
<th>Horsepower (kW)</th>
<th>Short Circuit Current (kA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>150</td>
</tr>
<tr>
<td>30</td>
<td>250</td>
</tr>
<tr>
<td>55</td>
<td>350</td>
</tr>
<tr>
<td>75</td>
<td>450</td>
</tr>
</tbody>
</table>

**Note:**
- Short Circuit Current Ratings are provided for different horsepower levels.
- The ratings are designed to ensure safe operation during short circuit events.

### Table: Selection Table

#### UL Type 12/IP 55 drives

<table>
<thead>
<tr>
<th>Power Supply Voltage</th>
<th>Motor Line Supply</th>
<th>Motor Protection</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>240/400 V</td>
<td>ATV212W075N4</td>
<td>600 V</td>
<td>ATV212W075N4</td>
</tr>
<tr>
<td>240/400 V</td>
<td>ATV212W075N4C</td>
<td>600 V</td>
<td>ATV212W075N4C</td>
</tr>
</tbody>
</table>

**Note:**
- Motor line supply and protection options are provided for easier selection.
- Part numbers for each configuration are listed.

### Dimensions (overall)

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Width</th>
<th>Height</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>6.8</td>
<td>1.1</td>
<td>7.6</td>
</tr>
<tr>
<td>40</td>
<td>8.6</td>
<td>1.4</td>
<td>7.1</td>
</tr>
<tr>
<td>55</td>
<td>10.4</td>
<td>1.7</td>
<td>6.6</td>
</tr>
<tr>
<td>75</td>
<td>12.2</td>
<td>2.0</td>
<td>6.1</td>
</tr>
<tr>
<td>110</td>
<td>14.0</td>
<td>2.3</td>
<td>5.6</td>
</tr>
</tbody>
</table>

**Note:**
- Dimensions are provided for different frame sizes.
- Width, Height, and Depth are measured in inches and millimeters.

---

## Selection Table

#### UL Type 12/IP 55 drives

<table>
<thead>
<tr>
<th>Power Supply Voltage</th>
<th>Motor Line Supply</th>
<th>Motor Protection</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>240/400 V</td>
<td>ATV212W075N4</td>
<td>600 V</td>
<td>ATV212W075N4</td>
</tr>
<tr>
<td>240/400 V</td>
<td>ATV212W075N4C</td>
<td>600 V</td>
<td>ATV212W075N4C</td>
</tr>
</tbody>
</table>

**Note:**
- Motor line supply and protection options are provided for easier selection.
- Part numbers for each configuration are listed.

### Dimensions (overall)

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Width</th>
<th>Height</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>6.8</td>
<td>1.1</td>
<td>7.6</td>
</tr>
<tr>
<td>40</td>
<td>8.6</td>
<td>1.4</td>
<td>7.1</td>
</tr>
<tr>
<td>55</td>
<td>10.4</td>
<td>1.7</td>
<td>6.6</td>
</tr>
<tr>
<td>75</td>
<td>12.2</td>
<td>2.0</td>
<td>6.1</td>
</tr>
<tr>
<td>110</td>
<td>14.0</td>
<td>2.3</td>
<td>5.6</td>
</tr>
</tbody>
</table>

**Note:**
- Dimensions are provided for different frame sizes.
- Width, Height, and Depth are measured in inches and millimeters.
### Altivar 212
#### variable speed drives

#### UL Type 12/IP 55 drives

**Altivar 212**:

### Selection Table

#### UL Type 12/IP 55 drives (frequency range from 0.5 to 200 Hz)

<table>
<thead>
<tr>
<th>Power Line supply</th>
<th>Altivar 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>380V 400V</td>
<td>ATV212W07N4</td>
</tr>
<tr>
<td>400V (EC/NEC)</td>
<td>ATV212W14N4</td>
</tr>
</tbody>
</table>

#### Three-phase supply voltage 380…480 V 50/60 Hz, with integrated category C2 or C3 EMC filter

<table>
<thead>
<tr>
<th>HP kW</th>
<th>1</th>
<th>1.5</th>
<th>2.2</th>
<th>3</th>
<th>4</th>
<th>5.5</th>
<th>7.5</th>
<th>11</th>
<th>15</th>
<th>22</th>
<th>30</th>
<th>56.7</th>
<th>44.7</th>
<th>22</th>
<th>58.5</th>
<th>64.4</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage 50/60 Hz</td>
<td>ATV212W07N4</td>
<td>ATV212W14N4</td>
<td>ATV212W22N4</td>
<td>ATV212W30N4</td>
<td>ATV212W45N4</td>
<td>ATV212W55N4</td>
<td>ATV212W71N4</td>
<td>ATV212W95N4</td>
<td>ATV212W115N4</td>
<td>ATV212W155N4</td>
<td>ATV212W220N4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous power (W)</td>
<td>ATV212W07N4</td>
<td>ATV212W14N4</td>
<td>ATV212W22N4</td>
<td>ATV212W30N4</td>
<td>ATV212W45N4</td>
<td>ATV212W55N4</td>
<td>ATV212W71N4</td>
<td>ATV212W95N4</td>
<td>ATV212W115N4</td>
<td>ATV212W155N4</td>
<td>ATV212W220N4</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>ATV212W07N4</td>
<td>ATV212W14N4</td>
<td>ATV212W22N4</td>
<td>ATV212W30N4</td>
<td>ATV212W45N4</td>
<td>ATV212W55N4</td>
<td>ATV212W71N4</td>
<td>ATV212W95N4</td>
<td>ATV212W115N4</td>
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<td>ATV212W220N4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

#### Dimensions (overall)

<table>
<thead>
<tr>
<th>Frame size</th>
<th>W x H x D (mm)</th>
<th>Dimensions (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3.9 x 6.3 x 1.7</td>
<td>1.5 x 2.5 x 0.7</td>
</tr>
<tr>
<td>10</td>
<td>5.9 x 9.7 x 3.9</td>
<td>2.3 x 3.8 x 1.6</td>
</tr>
<tr>
<td>11</td>
<td>12.2 x 6.2 x 2.6</td>
<td>4.8 x 2.4 x 1.0</td>
</tr>
<tr>
<td>12</td>
<td>21.0 x 9.0 x 4.7</td>
<td>8.3 x 3.5 x 1.9</td>
</tr>
<tr>
<td>14</td>
<td>31.0 x 11.8 x 7.1</td>
<td>12.2 x 4.6 x 2.8</td>
</tr>
</tbody>
</table>

#### Power Table

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Altivar 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>480V, 3 phase</td>
<td>ATV212W07N4</td>
</tr>
<tr>
<td>380V, 400V</td>
<td>ATV212W14N4</td>
</tr>
</tbody>
</table>

#### Short Circuit Current Ratings

<table>
<thead>
<tr>
<th>Input voltage 50/60 Hz</th>
<th>HP kW</th>
<th>Input rating: 10 kA</th>
<th>Part number</th>
<th>Frame size</th>
</tr>
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<tbody>
<tr>
<td>ATV212H07M3X</td>
<td>0.75</td>
<td>1</td>
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<td>1.49 x 88.4</td>
</tr>
<tr>
<td>ATV212H14M3X</td>
<td>1.5</td>
<td>2</td>
<td>ATV212H14M3X</td>
<td>1.49 x 88.4</td>
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<tr>
<td>ATV212H22M3X</td>
<td>2.2</td>
<td>3</td>
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<tr>
<td>ATV212H30M3X</td>
<td>3</td>
<td>4</td>
<td>ATV212H30M3X</td>
<td>1.49 x 88.4</td>
</tr>
<tr>
<td>ATV212H45M3X</td>
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<td>6</td>
<td>ATV212H55M3X</td>
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<tr>
<td>ATV212H71M3X</td>
<td>7.1</td>
<td>7</td>
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<td>1.49 x 88.4</td>
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<tr>
<td>ATV212H95M3X</td>
<td>9.5</td>
<td>8</td>
<td>ATV212H95M3X</td>
<td>1.49 x 88.4</td>
</tr>
<tr>
<td>ATV212H115M3X</td>
<td>11.5</td>
<td>9</td>
<td>ATV212H115M3X</td>
<td>1.49 x 88.4</td>
</tr>
<tr>
<td>ATV212H155M3X</td>
<td>15.5</td>
<td>10</td>
<td>ATV212H155M3X</td>
<td>1.49 x 88.4</td>
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<tr>
<td>ATV212H220M3X</td>
<td>22</td>
<td>11</td>
<td>ATV212H220M3X</td>
<td>1.49 x 88.4</td>
</tr>
</tbody>
</table>

#### Frame size W x H x D

<table>
<thead>
<tr>
<th>Frame size</th>
<th>W x H x D (mm)</th>
<th>Dimensions (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3.9 x 6.3 x 1.7</td>
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<td>14</td>
<td>31.0 x 11.8 x 7.1</td>
<td>12.2 x 4.6 x 2.8</td>
</tr>
</tbody>
</table>
Altivar 212 variable speed drives

Accessories & Options

**Configuration tools**

- **SoMove setup software**: Altivar 212 drive configuration with Multi-Loader tool or iPad connected to the Altivar 212 drive.
- **USB/RJ45 cable**: 30-pin mobile / RS485 with RJ45 connector.
- **Modbus/Telway-Bluetooth® adaptor**: USB port on the PC. Range of 32.8 ft, 10 m, (class 2).
- **ATV212 USB/RJ45 cable**: Required for connecting the iPad to the Altivar 212 drive. Equipped with one 30-pin mobile to RJ45 connector.
- **Cordset for Multi-Loader tool**: For connecting the Multi-Loader tool to the Altivar 212 drive. Equipped with a non-locking RJ45 connector with special mechanical catch on the drive end and an RJ45 connector on the Multi-Loader end.
- **Altivar Programming Tool iPad App**: For creating and saving configurations for the Altivar 212 and S-Flex variable speed drives. Available for free on iTunes.
- **Cordset for iPad**: For connecting the iPad to the Altivar 212 drive. Equipped with one 30-pin mobile to RS485 converter cable with RJ45 connector.

**User interface keypads**

- **Remote graphic display keypad**: Available on iTunes.
- **Remote mounting accessories for the graphic display keypad**: Can be used to provide IP 85 degrees of protection.
- **Remote mounting accessories for RJ45 connection with IP 85 degrees of protection**: Equipped with an RJ45 connector and an RJ45 cable. For connecting on drive equipped with a VW3A1100 cable.

**Accessories & Options**

- **Motor local control keys**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.
- **Motor local control keys (1)**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.
- **Motor local control keys (2)**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.

**User interface keypads**

- **Remote graphic display keypad**: Available on iTunes.
- **Remote mounting accessories for the graphic display keypad**: Can be used to provide IP 85 degrees of protection.
- **Remote mounting accessories for RJ45 connection with IP 85 degrees of protection**: Equipped with an RJ45 connector and an RJ45 cable. For connecting on drive equipped with a VW3A1100 cable.

**Accessories & Options**

- **Motor local control keys**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.
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- **Motor local control keys (2)**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.

**User interface keypads**

- **Remote graphic display keypad**: Available on iTunes.
- **Remote mounting accessories for the graphic display keypad**: Can be used to provide IP 85 degrees of protection.
- **Remote mounting accessories for RJ45 connection with IP 85 degrees of protection**: Equipped with an RJ45 connector and an RJ45 cable. For connecting on drive equipped with a VW3A1100 cable.

**Accessories & Options**

- **Motor local control keys**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.
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- **Motor local control keys (2)**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.

**User interface keypads**

- **Remote graphic display keypad**: Available on iTunes.
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**Accessories & Options**

- **Motor local control keys**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.
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- **Motor local control keys (2)**: 1. FWD/REV: reverses the direction of rotation of the motor. 2. STOP/RESET: stops the motor/resets drive detected fault state. 3. ESC key: aborts a value, a parameter or a menu to return to the previous selection.
Altivar 212 variable speed drives

Configuration tools

SoMove setup software
SoMove is PC user-friendly setup software for the device that allows users to configure, start-up, and maintain.

USB/RJ45 cable
A USB connector and an RJ45 connector used for connecting a PC to the Altivar 212 drive. Length: 8.2 ft., 2.5 m

Modbus/Uni-Telway-Bluetooth® adaptor
For establishing a Bluetooth® wireless connection between the Altivar 212 drive and a PC equipped with a Bluetooth® wireless link. Pack contents:
- 1 Bluetooth® adaptor (range: 65.6 ft., 20 m, class 2) with an RJ45 connector
- For SoMove: 3.3 x 3.1 ft., 1 x 0.1 m, cordset with 2 RJ45 connectors
- For Telio/Suite: 3.3 x 3.1 ft., 1 x 0.1 m, cordset with 1 RJ45 connector and 1 connector of mini DIN type

USB - Bluetooth® adaptor for PC
Required for a PC which is not equipped with Bluetooth® technology. Connects to a USB port on the PC. Range of 32.8 ft., 10 m, (class 2).

Multi-Loader tool (1)
For copying a configuration on a PC or drive and duplicating it on another drive. The Altivar 212 drives do not need to be powered-up. Supplied with the tool:
- 1 cordset equipped with 2 RJ45 connectors
- 1 cordset equipped with a USB type A connector and a USB Mini-B type connector
- 1 x 2 GB SD memory card
- 1 female/female RJ45 adaptor
- A 1.5 V battery

Note: Parameter files created using SoMove cannot be directly transferred to the Multi-Loader tool.

Cordset for Multi-Loader tool (2)
For connecting the Multi-Loader tool to the Altivar 212 drive. Equipped with a non-locking RJ45 connector with special mechanical catch on the drive end and an RJ45 connector on the Multi-Loader end.

Altivar Programming Tool iPad App (3)
For creating and saving configurations for the Altivar 212 and S-Flex variable speed drives. Available for free on iTunes.

Cordset for iPad (4)
For connecting the iPad to the Altivar 212 drive. Equipped with one 30-pin mobile to RS485 converter cable with RJ45 connector.

User interface keypads
Remote graphic display keypad
This graphic display keypad, common to all Schneider Electric’s variable speed drive ranges, provides a user-friendly interface for configuration, debugging, and maintenance. In particular, it is possible to transfer and store up to 4 configuration files. Used as a portable unit or mounted on an enclosure door, it can also be connected to several drives using remote mounting accessories (see below) or multidrop connection accessories.

It is supplied with six languages installed (Chinese, English, French, German, Italian and Spanish). The available languages can be modified using the Multi-Loader configuration tool (VW3A8121).

Its maximum operating temperature is 140°F (60°C), and it features IP 54 protection; this can be increased to IP 65 when mounted on an enclosure door.

Graphic display:
- Plain text display on 8 lines of 24 characters, 240 x 160 pixels, large digit display
- Assignable function keys (2) keys F1, F2, F3, F4.
- Dialogue functions: direct access, help screens, navigation
- Application functions: “Local Remote”, preset speed
- ESC key: aborts a value, a parameter or a menu to return to the previous selection
- Motor local control keys (4):
  - RUN: starts the motor
  - STOP/RESET: stops the motor/resets drive detected fault state
  - FWD/REV: reverses the direction of rotation of the motor
- Navigation button (5) for quick, easy access to the drop-down menus
- Rotate a: goes to the next/previous line, increases/decreases the value
- Panic: saves the current value (ENT)

Remote graphic display keypad
Remote mounting accessories for graphic display keypad
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Remote graphic display keys:
- F1: access to the parameter menu
- F2: access to the operation menu
- F3: access to the diagnostics menu
- F4: access to the application menu

Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Remote mounting accessories for graphic display keypad
Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Remote mounting accessories for graphic display keypad
Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Accessibility:
- IP 55 degree of protection
- Remote mounting accessories for graphic display keypad
- Internal IP 55 cables equipped with an RJ45 connector and an IP 55 rubber base:
- For remote location of the drive’s RS45 port while maintaining IP 55 protection
- IP 55 cable equipped with an RJ45 connector and an IP 55 rubber base:
- For connecting an drive equipped with a VW3A1002 cable

Remote mounting accessories for graphic display keypad
Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Remote mounting accessories for graphic display keypad
Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Remote mounting accessories for graphic display keypad
Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.

Remote mounting accessories for graphic display keypad
Remote mounting kit
A comprises a mounting cable VW3A1104 and an RJ45 adapter VW3A1105 must be provided.
Altivar 212
variable speed drives

Accessories & Options

Communication networks

The Altivar 212 drive is designed to be flexible and comply with the configurations found in communicating installations created for buildings (HVAC). It is easily integrated in building management systems thanks to its integrated communication protocols. In addition, the LonWorks communication card offered as an option provides the user with an open and interoperable system.

The Altivar 212 drive integrates a standard card which supports the Modbus, METASYS N2, APOGEE FLN P1 and BACnet communication protocols.

For optimum management flexibility, two communication ports located on the front of the drive (with the door open) enable simultaneous connection to a communication network and an HMI terminal.

The Altivar 212 drive has been designed to simplify connections to communication networks by offering directly accessible connectors:
- An RJ45 communication port for the Modbus serial link.
- A network port is mainly assigned to the remote graphic display keypad (Drive Navigator).

It is also used to connect:
- The Multi-Loader configuration tool
- The Bluetooth® serial link
- A Magelis industrial HMI terminal
- A Modbus drop cable

A screw terminal block for Modbus, METASYS N2, APOGEE FLN P1 and BACnet networks (optimized solution for daisy chain connection). This screw terminal block is assigned to control and signalling by a PLC or by another type of controller.

Connection accessories for Modbus serial link (optimized solution for daisy chain connection)

<table>
<thead>
<tr>
<th>Description</th>
<th>Item no.</th>
<th>Length</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS 485 double shielded twisted pair Modbus cable (with 2 RJ45 connectors)</td>
<td>(1)</td>
<td>30 ft</td>
<td>VW3A015000</td>
<td>0.1 lbs</td>
</tr>
<tr>
<td>Modbus splitter box</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with 2 RJ45 connectors</td>
<td>(1)</td>
<td>-</td>
<td>VW3A01501</td>
<td>0.3 lbs</td>
</tr>
<tr>
<td>Slot terminal block</td>
<td>(2)</td>
<td>1 pc</td>
<td>VW3A01502</td>
<td>0.2 lbs</td>
</tr>
<tr>
<td>Modbus connector</td>
<td>(4)</td>
<td>3 pc</td>
<td>VW3A01503</td>
<td>0.3 lbs</td>
</tr>
<tr>
<td>Modbus T-junction box</td>
<td>(5)</td>
<td>2 pc</td>
<td>VW3A01504</td>
<td>0.4 lbs</td>
</tr>
<tr>
<td>Line termination for RJ45 connector</td>
<td>(6)</td>
<td>1 pc</td>
<td>VW3A01505</td>
<td>0.1 lbs</td>
</tr>
</tbody>
</table>

Other connection accessories for Modbus serial link

<table>
<thead>
<tr>
<th>Description</th>
<th>Item no.</th>
<th>Length</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus splitter box</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with 2 RJ45 connectors and 1 screw terminal block</td>
<td>(1)</td>
<td>-</td>
<td>LGU1G03</td>
<td>0.5 lbs</td>
</tr>
<tr>
<td>Modbus connector</td>
<td>(4)</td>
<td>3 pc</td>
<td>VW3A01506</td>
<td>0.4 lbs</td>
</tr>
<tr>
<td>Modbus T-junction box with integrated cable</td>
<td>(5)</td>
<td>2 pc</td>
<td>VW3A01507</td>
<td>0.4 lbs</td>
</tr>
<tr>
<td>Line termination for RJ45 connector</td>
<td>(6)</td>
<td>1 pc</td>
<td>VW3A01508</td>
<td>0.1 lbs</td>
</tr>
</tbody>
</table>

Internal IP 55 cable, equipped with an RJ45 connector and an IP 55 FL45 base:

<table>
<thead>
<tr>
<th>Description</th>
<th>Item no.</th>
<th>Length</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal IP 55 cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>equipped with an RJ45 connector and an IP 55 FL45 base</td>
<td>(1)</td>
<td>1.0 ft</td>
<td>VW3A01500</td>
<td>0.3 lbs</td>
</tr>
<tr>
<td>For remote location of the drive’s FL45 port while maintaining IP 55 protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>-</td>
<td>VW3A01501</td>
<td>0.1 lbs</td>
</tr>
</tbody>
</table>

IP 55 cordset equipped with an RJ45 connector and an IP 55 FL45 base:

<table>
<thead>
<tr>
<th>Description</th>
<th>Item no.</th>
<th>Length</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP 55 cordset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>equipped with an RJ45 connector and an IP 55 FL45 base</td>
<td>(1)</td>
<td>1.0 ft</td>
<td>VW3A01502</td>
<td>0.3 lbs</td>
</tr>
<tr>
<td>They can be used to connect a drive equipped with a VW3A01505 cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

iPad Programming

The iPad application can perform the following programming actions:
- Create parameter files
- Validate drive configurations
- Upload, download or clone drive settings
- Retain digital copies of drive settings
- Links to all product information embedded in app

Optional LonWorks communication card

The Altivar 212 drive can also be connected to the LonWorks network by using the communication card (4) available as an option. It is connected by replacing the standard card (3) on the drive.

The connections are identical to those on the standard card:
- An RJ45 communication port for the Modbus serial link: this network port is mainly assigned to the remote graphic display keypad (Drive Navigator).
- It is also used to connect:
  - The Multi-Loader configuration tool
  - The Bluetooth® serial link
  - A Magelis industrial HMI terminal
  - A Magelis industrial HMI terminal

The Altivar 212 drive can be controlled using the LonWorks 6010 (Variable Speed Motor Drive) and LonWorks 6000 (Node Object) profiles.

iPad Programming

The iPad application can perform the following programming actions:
- Create parameter files
- Validate drive configurations
- Upload, download or clone drive settings
- Retain digital copies of drive settings
- Links to all product information embedded in app

Links to all product information embedded in app
Altivar 212 variable speed drives

Accessories & Options

Communication networks

The Altivar 212 drive is designed to be fully configurable, allowing for the configuration of the drive based on the needs of the application. It is easily integrated into building management systems thanks to its integrated communication protocols. In addition, the LoRaWAN communication card offered as an option provides the user with an open and interoperable system.

The Altivar 212 drive integrates a standard card which supports the Modbus, METASYS N2, APOGEE FLN P1 and BACnet communication protocols.

For optimum management flexibility, two communication ports located on the front of the drive (with the door open) enable simultaneous connection to a communication network and an HMS terminal.

The Altivar 212 drive has been designed to simplify connections to communication networks by offering directly accessible connections:
- An RJ45 communication port for the Modbus serial link:
- This network port is mainly assigned to the remote graphic display keypad (Drive Navigator).
- It is also used to connect:
  - The Multi-Loader configuration tool
  - The Bluetooth® serial link
  - A Magelis industrial HMS terminal
  - A RJ45 port with appropriate adapter cable
- A screw terminal block for Modbus, METASYS N2, APOGEE FLN P1 and BACnet networks (optimized solution for daisy chain connections). This screw terminal block is assigned to control and signalling by a PLC or by another type of controller.

The speed control and reference may come from different sources:
- Motor Drive
- Communication network
- I/O terminals
- Adjustment
- Configuration

Communication is monitored according to criteria specific to each protocol.

All the drive functions can be accessed via the network:
- Control
- Monitoring
- Adjustment
- Configuration

The advanced functions of the Altivar 212 enable switching of these drive control sources to be managed in accordance with the application requirements.

The speed control and reference may come from different sources:

The iPad application can perform the following programming actions:

- Create parameter files
- Validate drive configurations
- Upload, download or clone drive settings
- Retain digital copies of drive settings
- Links to all product information embedded in app

Optional LonWorks communication card

The Altivar 212 drive can also be connected to the LonWorks network by using the communication card (4) available as an option. It is connected by replacing the standard card (3) on the drive.

The connections are identical to those on the standard card:
- An RJ45 communication port for the Modbus serial link:
- This network port is mainly assigned to the remote graphic display keypad (Drive Navigator).

It is also used to connect:
- The Multi-Loader configuration tool
- The Bluetooth® serial link
- A Magelis industrial HMS terminal
- A board with 30-pin mobile to RJ485 cable
- A screw terminal block for Modbus and the LonWorks network (optimized solution for daisy chain connection). This screw terminal block is assigned to control and signalling by a PLC or by another type of controller.

The Altivar 212 drive can be controlled using the LoRaWAN 6010 (Variable Speed Motor Drive) and LoRaWorks 6000 (Node Object) profiles.

Communication is monitored according to criteria specific to each protocol.

However, regardless of the protocol, it is possible to configure how the drive responds to a communication fault:
- Fixed-speed stop
- Standstill and brake stop
- Maintain last command received

The iPad application can perform the following programming actions:

- Create parameter files
- Validate drive configurations
- Upload, download or clone drive settings
- Retain digital copies of drive settings
- Links to all product information embedded in app
Altivar 212 variable speed drives

Mounting accessories

DIN rail mounting kit
This kit enables easy installation of ATV212H075M3X…HU22M3X and ATV212H075N4…HU22N4 drives by mounting them directly on a 35 mm wide DIN rail.

<table>
<thead>
<tr>
<th>For drives</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075M3X…HU22M3X</td>
<td>VW3A1852</td>
<td>0.8 kg</td>
</tr>
<tr>
<td>ATV212H075N4…HU22N4</td>
<td>VW3A1852</td>
<td>0.4 kg</td>
</tr>
</tbody>
</table>

UL Type 1 mounting kit
When the drive is mounted directly on a wall outside the enclosure, this kit can be used to ensure UL Type 1. The shielding is connected inside the kit.

This kit consists of:

- All the mechanical parts (1) including a pre-cut plate (2) for connecting the tubes
- Mounting accessories
- A manual

For drives | Part number | Weight |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075M3X…HU22M3X</td>
<td>VW3A1814</td>
<td>1.1 lbs</td>
</tr>
<tr>
<td>ATV212H075N4…HU22N4</td>
<td>VW3A1815</td>
<td>0.5 lbs</td>
</tr>
<tr>
<td>ATV212H150M3X…HU30M3X</td>
<td>VW3A1816</td>
<td>2.0 lbs</td>
</tr>
<tr>
<td>ATV212H150N4…HU30N4</td>
<td>VW3A1816</td>
<td>0.9 lbs</td>
</tr>
<tr>
<td>ATV212H220M3X…HU55M3X</td>
<td>VW3A1817</td>
<td>2.6 lbs</td>
</tr>
<tr>
<td>ATV212H220N4…HU55N4</td>
<td>VW3A1817</td>
<td>1.2 lbs</td>
</tr>
<tr>
<td>ATV212H311M3X…H311M3X</td>
<td>VW3A0206</td>
<td>8.8 lbs</td>
</tr>
<tr>
<td>ATV212H311N4…H311N4</td>
<td>VW3A0206</td>
<td>4.0 lbs</td>
</tr>
<tr>
<td>ATV212H315M3X…H315M3X</td>
<td>VW3A0207</td>
<td>11.0 lbs</td>
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<tr>
<td>ATV212H315N4…H315N4</td>
<td>VW3A0207</td>
<td>5.0 lbs</td>
</tr>
<tr>
<td>ATV212H330M3X</td>
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</tr>
<tr>
<td>ATV212H330N4…H315N4</td>
<td>VW3A0208</td>
<td>7.0 lbs</td>
</tr>
</tbody>
</table>

Drive input filters

EMC Compliance
Integrated EMC input filters
Altivar 212 drives, except for ATV212H075M3X, have integrated radio interference input filters to comply with the EMC standard for variable speed electrical power drive "products" IEC/EN 61800-3, edition 2, category C1, C2 or C3 in environment 1 or 2 and to comply with the European EMC (electromagnetic compatibility) directive.

Drives Maximum length of shielded cable

<table>
<thead>
<tr>
<th>DRIVE</th>
<th>Maximum length of shielded cable (1)</th>
<th>Leakage current (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075M3X…HU22M3X</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H075N4…HU22N4</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H150M3X…HU30M3X</td>
<td>16.4 m 5</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H150N4…HU30N4</td>
<td>16.4 m 5</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H220M3X…HU55M3X</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H220N4…HU55N4</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H311M3X…H311M3X</td>
<td>16.4 m 5</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H311N4…H311N4</td>
<td>16.4 m 5</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H315M3X…H315M3X</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H315N4…H315N4</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H330M3X</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
<tr>
<td>ATV212H330N4…H315N4</td>
<td>16.4 m 20</td>
<td>65.6 m 20</td>
</tr>
</tbody>
</table>

(1) Maximum lengths for shielded cables connecting motors to drives for a switching frequency of 6 to 16 kHz. If motors are connected in parallel, the sum of the cable lengths must be taken into account.
(2) Maximum ground leakage current at 480 V 60 Hz on a TT system.
Altivar 212
variable speed drives

Mounting accessories

**DIN rail mounting kit**
This kit enables easy installation of ATV212H075M3X...HU22M3X and ATV212H075N4...HU22N4 drives by mounting them directly on a 35 mm wide DIN rail.

For drives | Part number | Weight
--- | --- | ---
ATV212H075M3X...HU22M3X | VW3A1815 | 1.1 0.5
ATV212H075N4...HU22N4 | VW3A1816 | 2.0 0.9

**UL Type 1 mounting kit**
When the drive is mounted directly on a wall outside the enclosure, this kit can be used to ensure UL Type 1. The shielding is connected inside the kit. The kit consists of:
- All the mechanical parts(1) including a pre-cut plate(2) for connecting the tubes(3)
- Mounting accessories
- A manual

For drives | Part number | Weight
--- | --- | ---
ATV212H075M3X...HU22M3X | VW3A31814 | 1.1 0.5
ATV212H075N4...HU22N4 | VW3A31815 | 2.0 0.9
ATV212H075M3X...HU22M3X | VW3A31816 | 2.6 1.2
ATV212H075N4...HU22N4 | VW3A31817 | 8.8 4.0
ATV212H115M3X...H185M3X | VW3A31818 | 11.0 5.0
ATV212H115N4...H185N4 | VW3A31819 | 15.4 7.0

Drive input filters

**EMC Compliance**

**Integrated EMC input filter**
Altivar 212 drives, except for ATV212H075M3X, have integrated radio interference input filters to comply with the EMC standard for variable speed electrical power drive "products" IEC/EN 61800-3, edition 2, category C1, C2 or C3 in environment 1 or 2 and to comply with the European EMC (electromagnetic compatibility) directive.

<table>
<thead>
<tr>
<th>Drives</th>
<th>Maximum length of shielded cable(1)</th>
<th>Leakage current(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075N4...HU22N4</td>
<td>65.6 20 65.6 20</td>
<td>4.5</td>
</tr>
<tr>
<td>ATV212HU30N4...HU55N4</td>
<td>16.4 5 65.6 20</td>
<td>3.8</td>
</tr>
<tr>
<td>ATV212HU55N4, HD11N4</td>
<td>16.4 5 65.6 20</td>
<td>3.4</td>
</tr>
<tr>
<td>ATV212HD15N4, HD18N4</td>
<td>16.4 5 65.6 20</td>
<td>2.9</td>
</tr>
<tr>
<td>ATV212HD22N4, HD30N4</td>
<td>16.4 5 65.6 20</td>
<td>2.6</td>
</tr>
<tr>
<td>ATV212HD37N4, HD45N4</td>
<td>16.4 5 65.6 20</td>
<td>2.3</td>
</tr>
<tr>
<td>ATV212HD55N4, HD75N4</td>
<td>16.4 5 65.6 20</td>
<td>2.0</td>
</tr>
<tr>
<td>ATV212W075N4...WU22N4</td>
<td>65.6 20 65.6 20</td>
<td>4.5</td>
</tr>
<tr>
<td>ATV212WU30N4...WU55N4</td>
<td>16.4 5 65.6 20</td>
<td>3.8</td>
</tr>
<tr>
<td>ATV212WU75N4</td>
<td>16.4 5 65.6 20</td>
<td>3.4</td>
</tr>
<tr>
<td>ATV212WD11N4, WD15N4</td>
<td>16.4 5 65.6 20</td>
<td>2.9</td>
</tr>
<tr>
<td>ATV212WD18N4</td>
<td>16.4 5 65.6 20</td>
<td>2.6</td>
</tr>
<tr>
<td>ATV212WD22N4, WD30N4</td>
<td>16.4 5 65.6 20</td>
<td>2.3</td>
</tr>
<tr>
<td>ATV212WD37N4, WD45N4</td>
<td>16.4 5 65.6 20</td>
<td>2.0</td>
</tr>
<tr>
<td>ATV212WD55N4, WD75N4</td>
<td>16.4 5 65.6 20</td>
<td>1.8</td>
</tr>
</tbody>
</table>

(1) Maximum length of shielded cable connecting motors or drives for a switching frequency of 6 to 16 kHz. If motors are connected in parallel, the sum of the cable lengths must be taken into account.
(2) Maximum ground leakage current at 480 V 60 Hz on a TT system.

Mounting the filter under the Altivar 212 drive

Mounting the filter beside the Altivar 212 drive

Accessories & Options

**Accessories & Options**

1. **Mounting accessories**
2. **Drive input filters**
3. **EMC Compliance**

**Integrated EMC input filters**
Altivar 212 drives, except for ATV212H075M3X, have integrated radio interference input filters to comply with the EMC standard for variable speed electrical power drive "products" IEC/EN 61800-3, edition 2, category C1, C2 or C3 in environment 1 or 2 and to comply with the European EMC (electromagnetic compatibility) directive.

1. **Mounting accessories**
- DIN rail mounting kit
- UL Type 1 mounting kit

2. **Drive input filters**
- Maximum length of shielded cable according to:
- Leakage current:

3. **EMC Compliance**
- Integrated EMC input filters
For drives

<table>
<thead>
<tr>
<th>Designation</th>
<th>For motor choke</th>
<th>Reference</th>
<th>Weight</th>
<th>UL recognized</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075N4</td>
<td>ATV212H075N4C</td>
<td>VW3A1102</td>
<td>11.0 6.8</td>
<td>11.0 6.8</td>
</tr>
<tr>
<td>ATV212H150N4</td>
<td>ATV212H150N4C</td>
<td>VW3A1102</td>
<td>18.0 10.5</td>
<td>18.0 10.5</td>
</tr>
<tr>
<td>ATV212H220N4</td>
<td>ATV212H220N4C</td>
<td>VW3A1102</td>
<td>25.0 14.5</td>
<td>25.0 14.5</td>
</tr>
<tr>
<td>ATV212H075N4</td>
<td>ATV212H075N4C</td>
<td>VW3A1112</td>
<td>6.0 3.3</td>
<td>6.0 3.3</td>
</tr>
<tr>
<td>ATV212H150N4</td>
<td>ATV212H150N4C</td>
<td>VW3A1112</td>
<td>15.0 8.3</td>
<td>15.0 8.3</td>
</tr>
<tr>
<td>ATV212H220N4</td>
<td>ATV212H220N4C</td>
<td>VW3A1112</td>
<td>22.0 12.3</td>
<td>22.0 12.3</td>
</tr>
</tbody>
</table>

Drive output filters

Motor Chokes

Motor chokes, also known as load reactors, can be inserted between the ATV212 drive and the motor to:

- Reduce the peak voltage in the motor and motor cable
- Limit the dv/dt at the motor terminals (600 to 1500 V/μs) for cables longer than 45 ft (15 m)
- Filter interference caused by opening of a contactor placed between the filter and the motor
- Reduce the motor ground leakage current and lower the chance of nuisance ground fault trips
- Smooth the motor current waveform to reduce motor noise

Choke performance is optimized by not exceeding the cable lengths given below. For an application with several motors connected in parallel, the cable length must include all cabling. If a cable longer than that recommended is used, the motor chokes may overheat.

IP 20 protection kit

The motor chokes provide IP 60 degrees of protection as standard. This kit gives the VWA0514H choke IP 90 degrees of protection.

Designation

For motor choke | Reference | Weight | kg
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV212H075N4</td>
<td>VW3A1102</td>
<td>11.0 6.8</td>
</tr>
</tbody>
</table>

Mechanical kit including an IP 20 cover and cable clips.

VWA0514H
Altivar 212 variable speed drives

Accessories & Options

- Additional EMC input filters are designed to meet more stringent requirements. They are designed to reduce conducted emissions on the line supply below the limits of standards EN 55011 group 1, class A or B, and IEC/EN 61800-3-category C1, C2 or C3.
- The additional EMC filters can be mounted beside or under the drive. The drive's power supply is then connected directly via the filter output cable.
- The filters act as a support for the drives and are attached to them via tapped holes.
- Additional filters can only be used on TN (neutral connection) and TT (neutral to ground) type systems.
- Standard IEC/EN 61800-3, appendix D.1, states that on IT systems (isolated or impedance grounded neutral), filters can prevent permanent insulation monitors to operate in a random manner. In addition, the effectiveness of additional filters on this type of system depends on the type of impedance between neutral and ground, and therefore cannot be predicted.
- If a filter has to be installed on an IT system, the solution would be to insert an isolation transformer and connect the machine locally on a TN or TT system.
- ATV 212 (18 - 440 V) drives have integrated EMC filters. These filters can be easily disconnected for use on the line supply and, if necessary, reconnected as easily (see the User Manual).

<table>
<thead>
<tr>
<th>For drives</th>
<th>Maximum motor cable length</th>
<th>Losses</th>
<th>Nominal current</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft</td>
<td>m</td>
<td>A</td>
<td>mA</td>
<td>W</td>
</tr>
<tr>
<td>ATM1212HU2M4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ATM1212HU2M4</td>
<td>328.1</td>
<td>100</td>
<td>90</td>
<td>84.5</td>
<td>13.5</td>
</tr>
<tr>
<td>ATM1212HU2M4</td>
<td>328.1</td>
<td>100</td>
<td>350</td>
<td>90</td>
<td>84.5</td>
</tr>
<tr>
<td>ATM1212HU2M4</td>
<td>328.1</td>
<td>100</td>
<td>350</td>
<td>90</td>
<td>328.1</td>
</tr>
<tr>
<td>ATM1212HU2M4</td>
<td>328.1</td>
<td>100</td>
<td>350</td>
<td>90</td>
<td>328.1</td>
</tr>
</tbody>
</table>

Drive output filters

Motor Chokes

- Motor chokes, also known as load reactors, can be inserted between the Altivar 212 drive and the motor to:
  - Reduce the peak voltage in the motor and motor cable
  - Limit the dv/dt at the motor terminal (500 to 1500 V/μs) for cables longer than 544 ft (165 m)
- Filter interference caused by opening of a contactor placed between the filter and the motor
- Reduce the motor ground leakage current and lower the chance of nuisance ground fault trips
- Smooth the motor current waveform to reduce motor noise

Choke performance is optimised by not exceeding the cable lengths given below. For an application with several motors connected in parallel, the cable length must also include all cabling. If a cable longer than that recommended is used, the motor chokes may overheat.

For drives

- Maximum motor cable length
- Losses
- Nominal current
- Part number
- Weight

Three-phase supply voltage: 200...240 V 50/60 Hz

<table>
<thead>
<tr>
<th>For drives</th>
<th>Maximum motor cable length</th>
<th>Losses</th>
<th>Nominal current</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft</td>
<td>m</td>
<td>A</td>
<td>mA</td>
<td>W</td>
</tr>
<tr>
<td>ATM1212HU7M3X</td>
<td>328.1</td>
<td>100</td>
<td>90</td>
<td>84.5</td>
<td>13.5</td>
</tr>
<tr>
<td>ATM1212HU7M3X</td>
<td>328.1</td>
<td>100</td>
<td>350</td>
<td>90</td>
<td>84.5</td>
</tr>
<tr>
<td>ATM1212HU7M3X</td>
<td>328.1</td>
<td>100</td>
<td>350</td>
<td>90</td>
<td>328.1</td>
</tr>
<tr>
<td>ATM1212HU7M3X</td>
<td>328.1</td>
<td>100</td>
<td>350</td>
<td>90</td>
<td>328.1</td>
</tr>
</tbody>
</table>

Three-phase supply voltage: 380...480 V 50/60 Hz

<table>
<thead>
<tr>
<th>For drives</th>
<th>Maximum motor cable length</th>
<th>Losses</th>
<th>Nominal current</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ft</td>
<td>m</td>
<td>A</td>
<td>mA</td>
<td>W</td>
</tr>
<tr>
<td>ATM1212HU7M3X</td>
<td>55.8</td>
<td>17.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ATM1212HU7M3X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

IP 20 protection kit

For motor choke reference: VW3A5103

- Mechanical kit including an IP 20 cover and cable clips.
Going green with the S-Flex drive offers:

- More than dollars and cents, you'll save with:
  - Energy savings — designed with energy economizing motor algorithms that maximize energy savings by reducing electricity usage
  - Internal PID regulator — allowing flow ratios to be adjusted for actual needs without additional hardware
  - Reduced equipment maintenance cost and downtime
  - 24/7 live technical support

- Save Time

- Save Money

- Think Green

The S-Flex enclosed drive assists with Leadership in Energy and Environmental Design (LEED®) certification. Green buildings enhance occupant comfort and health, decrease vacancy ratios, increase building valuation, and improve the bottom line by reducing operating costs. A building that runs smoothly ensures comfortable tenants, decreasing vacancy rates, increasing building valuation, and improving the bottom line by reducing operating costs. Building owners the ability to take advantage of state and local government energy incentives.

- Optimization of building management
- Offering flexibility and ease of adjustment for installations, thanks to its compatibility with building management system connectivity
- Reducing noise pollution (noise caused by air flow and motor)

Its various standard versions make it possible to reduce installation costs by integrating EMC filters, categories C1 to C3 depending on the model, which has the following advantages:

- Compact size
- Simplified wiring

The S-Flex enclosed drive helps to reduce equipment costs while optimizing its performance.

Reduced Harmonic Technology

The S-Flex drive revolutionizes harmonic mitigation with its innovative reduced harmonic technology. Significant harmonic reduction is achieved within the diode capacitor and power conversion section of the variable frequency drive, eliminating the need for a line reactor or bus reactor, which results in:

- Higher equipment efficiency
- Reduced equipment cost
- Fewer points of electrical failure
- Smaller enclosure size
- Lighter weight

Harmonics can be present in voltage, current, or both. Any power source that converts AC to DC can generate harmonics. Typical sources include:

- Office equipment
- Computers
- Medical equipment
- Microprocessors
- Uninterruptible power supplies
- Fluorescent lamp ballasts

Harmonic currents do not add additional power to the electrical system, but additional current flows through electrical wires. Effects may include:

- Overheating of electrical distribution system wiring
- Shortened transformer life
- Decreased power factor
- Disturbance of power measuring systems

Applications

The S-Flex enclosed drive considerably improves building management by:

- Simplifying circuits by removing flow control valves and dampers
- Offering flexibility and ease of adjustment for installations, thanks to its compatibility with building management system connectivity
- Reducing noise pollution (noise caused by air flow and motor)

The S-Flex enclosed offer helps to reduce equipment costs while optimizing its performance.

Altivar 212 with RHT compared to traditional 6-pulse rectifiers

The figure to the left shows a typical waveform of the Altivar 212 drive controller’s output current using a 460 V Altivar 212 (15 HP) and Schneider Electric’s Harmonic software per IEEE 519 recommendations for calculating harmonic distortion in <600V applications. The motor control processor and the motor control algorithm are designed to produce a sinusoidal waveform with very little distortion to the motor.

With lower DC bus capacitance, the Altivar 212 drive controller has a reduced capacity to ride through AC power line dips or sags. The Altivar 212 drive controller has an auto-restart feature and a robust catch-on-the-fly algorithm designed to minimize the effect of voltage dips and sags. The catch-on-the-fly algorithm has also proven to do an exceptional job of catching a reverse-spiral load, bringing the load to a standstill and accelerating in the proper direction. This catch-on-the-fly algorithm is a useful feature for wind milling fan loads. If voltage ride-through is a major concern in an installation, the Altivar 61, with its industry leading voltage sag ride-through capability may be the preferred solution.

Drive description

<table>
<thead>
<tr>
<th>THDI (%) of fundamental drive current</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-pulse, no added impedance</td>
</tr>
<tr>
<td>6-pulse, 3% AC reactor or DC bus choke</td>
</tr>
<tr>
<td>6-pulse, 5% AC reactor or DC bus choke</td>
</tr>
<tr>
<td>ATV212, no added impedance</td>
</tr>
<tr>
<td>ATV212, 1.5% AC reactor</td>
</tr>
</tbody>
</table>

(1) Higher first harmonic current due to mathematics

(163%)
**S-Flex enclosed variable speed drives**

**Introduction**

Take advantage of the Altivar 212 features by selecting the S-Flex enclosed version. The S-Flex provides an Altivar 212 packaged with the most common options required for commercial fan and pump applications. The S-Flex drive is an enclosed frequency converter for 1-100 HP, 0.75-75 kW three-phase asynchronous motors.

**Save Time**

Because specifying drives can be time-consuming, the S-Flex drive includes the most common requirements in HVAC specifications for fan and pump applications, such as:

- Simple start-up including preprogrammed parameters
- Quick installation with EZ-M mounting
- Easy wiring conduit knockouts on the enclosure
- Dedicated wiring terminal blocks
- Stock availability with bypass and main circuit breaker

**Save Money**

Offering unmatched value in installed cost and functionality, the S-Flex drive allows building owners, consulting engineers, and contractors to focus on the essentials of demanding commercial building applications.

More than dollars and cents, you’ll save with:

- Industry leading reduced harmonic technology — eliminating the need for line reactors and DC chokes
- Energy savings—designed with energy economizing motor algorithms that maximize energy savings by reducing electricity usage
- Internal PID regulator — allowing flow ratios to be adjusted for actual needs without additional hardware
- Reduced equipment maintenance cost and downtime
- 24/7 live technical support

**Think Green**

The S-Flex enclosed drive assists with Leadership in Energy and Environmental Design (LEED®) certification. Green buildings enhance occupant comfort and health, decrease vacancy rates, increase building valuation, and improve the bottom line by reducing operating costs. A building that runs smoothly ensures comfortable tenants, decrease vacancy rates, increase building valuation, and improve the bottom line by reducing operating costs.

Going green with the S-Flex drive offers:

- Building owners the ability to take advantage of states and local government energy incentives
- More marketable buildings to tenants seeking energy-efficient/sustainable facilities
- Retrofitting to existing systems
- The most efficient method of reduced speed and load control

**Applications**

Optimization of building management:

- Simplifying circuits by removing flow control valves and dampers
- Offering flexibility and ease of adjustment for installations, thanks to its compatibility with building management system connectivity
- Reducing noise pollution (noise caused by air flow and motor)

Its various standard versions make it possible to reduce installation costs by integrating EMC filters, categories C1 to C3 depending on the model, which has the following advantages:

- Compact size
- Simplified wiring

The S-Flex enclosed offer helps to reduce equipment costs while optimizing its performance.

**Reduced Harmonic Technology**

The S-Flex drive revolutionizes harmonic mitigation with its innovative reduced harmonic technology. Significant harmonic reduction is achieved within the diode capacitor and power conversion section of the variable frequency drive, eliminating the need for a line-reactor or bus-reactor, which results in:

- Higher equipment efficiency
- Reduced equipment cost
- Fewer points of electrical failure
- Smaller enclosure size
- Lighter weight

Harmonics can be present in voltage, current, or both. Any power source that converts AC to DC can generate harmonics. Typical sources include:

- Office equipment
- Computers
- Medical equipment
- Microprocessors
- Uninterruptible power supplies
- Fluorescent lamp ballasts

Harmonic currents do not add additional power to the electrical system, but additional current flows through electrical wires. Effects may include:

- Overheating of electrical distribution system wiring
- Shortened transformer life
- Decreased power factor
- Disturbance of power measuring systems

**Altivar 212 with RHT compared to traditional 6-pulse rectifiers**

The figure to the left shows a typical waveform of the Altivar 212 drive controller’s output current using a 460 V Altivar 212 (15 HP) and Schneider Electric’s HarmCalc software per IEEE 519 recommendations for calculating harmonic distortion in >600V applications. The motor control processor and the motor control algorithm are designed to produce a sinusoidal waveform with very little distortion to the motor.

With lower DC bus capacitance, the Altivar 212 drive controller has a reduced capacity to ride through AC power line dips or sags. The Altivar 212 drive controller has an auto-restart feature and a robust catch-on-the-fly algorithm designed to minimize the effect of voltage dips and sags. The catch-on-the-fly algorithm also proves to do an exceptional job of catching a reverse spinning load, bringing the load to a standstill and accelerating in the proper direction. This catch-on-the-fly algorithm is a useful feature for wind-milling fan loads. If voltage ride-through is a major concern in an installation, the Altivar 61, with its industry leading voltage sag ride-through capability may be the preferred solution.
Introduction

The S-Flex™ 212 enclosed drive is a full-featured adjustable speed package solution for variable torque applications. The S-Flex enclosed drive is a bypass package that includes an Altivar™ 212 adjustable speed drive on a wall-mountable back plane with pre-packaged model number options for both power and control functions. The following features are available for the standard bypass package:

- AFC-Off-Bypass selector switch
- Local/Remote configurable on controller
- Power On red LED
- Bypass Run green LED
- Freezer/Firestat interlock
- Form C AFC detected fault contact
- Modbus™ RJ-45 communication port
- Smoke purge and damper control relays
- Circuit breaker disconnect
- Optional line disconnect switch or line contactor
- Optional full text keypad
- Optional non-bypass power circuit

### Features

1. **Keypad display for configuration and monitoring**
   - Optional LCD keypad
2. **Through-the-door disconnect**
   - Electrical disconnect circuit breaker handle with electrical lock-out/tag-out
3. **Front access selector and lights**
   - Adjustable frequency controller — off — bypass selector switch
   - Power-on mode red LED indicator
   - Bypass mode green LED indicator
4. **EZ-M channel mounting**
   - Having the interface built into the enclosure makes parallel alignment of multiple drives quick and easy with an EZ-M mounting channel
5. **Hinged NEMA 1-rated enclosure**
   - Hinged door for quick and easy interior access
   - Run status LED
6. **Conduit knockouts**
   - Conduit knockouts on bottom of enclosure for quick and easy wiring to line and load terminals and control wiring terminations
7. **Short-circuit protection**
   - Square D circuit breaker offers electrical disconnect and overcurrent protection
8. **Bypass contactor**
   - Full-voltage bypass contactors with electrical interlocks allow for emergency full-speed operation
   - Damper Control and Smoke Purge relays for BAS interface
9. **Terminal block**
   - Easy customer control wiring interface with terminal block connections
10. **Three-phase AC line reactor**
    - Optional factory mounted and wired to provide increased protection from line transients as well as further reduction in drive-generated line harmonics

### Product

The S-Flex range of enclosed variable speed drives extends across a range of motor power ratings:

- 200...240 V three-phase, 1 HP to 40 HP, 0.75 kW to 30 kW, IP 21
- 380...480 V three-phase, 1 HP to 100 HP, 0.75 kW to 75 kW, IP 21
- 380...480 V three-phase, 1 HP to 100 HP, 0.75 kW to 75 kW, UL Type 12/IP 55

The S-Flex range also includes:

- Optional three-phase AC line reactor for line transient protection and even further line harmonic reduction
- Altivar™ 212 drive power converter with reduced harmonic technology and an IGBT inverter with pulse-width modulated output
- Optional LCD text keypad
- Built-in Modbus, BACnet®, Metasys®, APOGEE® P1 communication capability, and options for LONWorks®
- Smoke purge override and fan damper control in both Adjustable frequency controller (AFC) and bypass modes of operation
- Adjustable frequency controller — off — bypass selector switch
- Optional drive input disconnect switch provides an input line power disconnect switch between the main power disconnect and the power converter
- Optional line contactor provides an electrically interlocked line contactor between the main power disconnect and the power converter
- Power-on mode red LED indicator
- Bypass mode green LED indicator
- Terminal block for customer's control connections
- Full-voltage bypass contactors
- 100 kAIC UL® 508C rating and full-voltage bypass
- Square D circuit breaker or fused disconnect for power interruption and overcurrent protection
- Hinged door with latches for quick and easy interior access
- Conduit knockouts on bottom of enclosure for quick and easy wiring

### Function

The S-Flex™ 212 enclosed drive is a full-featured adjustable speed package solution for variable torque applications. The S-Flex enclosed drive is a bypass package that includes an Altivar™ 212 adjustable speed drive on a wall-mountable back plane with pre-packaged model number options for both power and control functions. The following features are available for the standard bypass package:

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- Bypass Run green LED
- Freezer/Firestat interlock
- Form C AFC detected fault contact
- Modbus™ RJ-45 communication port
- Smoke purge and damper control relays
- Circuit breaker disconnect
- Optional line disconnect switch or line contactor
- Optional full text keypad
- Optional non-bypass power circuit
Introduction

Product

The S-Flex™ 212 enclosed drive is a full-featured adjustable speed package solution for variable torque applications. The S-Flex enclosed drive is a bypass package that includes an Altivar™ 212 adjustable speed drive on a wall-mountable back plane with pre-packaged model number options for both power and control functions. The following features are available for the standard bypass package:

- Optional three-phase AC line reactor for line transient protection and even further line harmonic reduction
- Altivar™ 212 drive power converter with reduced harmonic technology and an IGBT inverter with pulse-width modulated output
- Optional LCD text keypad
- Built-in Modbus, BACnet®, Metasys® N2, APOGEE® P1 communication capability, and options for LonWorks®
- Smoke purge override and fan damper control in both Adjustable frequency controller (AFC) and bypass modes of operation
- Adjustable frequency controller — off — bypass selector switch
- Optional drive input disconnect switch provides an input line power disconnect switch between the main power disconnect and the power converter
- Optional line contactor provides an electrically interlocked line contactor between the main power disconnect and the power converter
- Power-on mode red LED indicator
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Features

- Keypad display for configuration and monitoring
- Optional LCD keypad
- Through-the-door disconnect
- Electrical disconnect circuit breaker handle with electrical lock-out/tag-out
- Front access selector and lights
- Adjustable frequency controller — off — bypass selector switch
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- EZ-M channel mounting
- Having the interface built into the enclosure makes parallel alignment of multiple drives quick and easy with an EZ-M mounting channel
- Hinged NEMA 1-rated enclosure
- Hinged door for quick and easy interior access
- Run status LED
- Conduit knockouts
- Conduit knockouts on bottom of enclosure for quick and easy wiring to line and load terminals and control wiring terminations
- Short-circuit protection
- Square D circuit breaker offers electrical disconnect and overcurrent protection
- 100,000 A Interrupt current (AIC), fully coordinated current rating to UL 508C and NEMA ICS7.1
- Bypass contactor
- Full-voltage bypass contactors with electrical interlocks allow for emergency full-speed operation
- Damper Control and Smoke Purge relays for BAS interface
- Terminal block
- Easy customer control wiring interface with terminal block connections
- Three-phase AC line reactor
- Optional factory mounted and wired to provide increased protection from line transients as well as further reduction in drive-generated line harmonics

Functions

- AFC-Off-Bypass selector switch
- Local/Remote configurable on controller
- Power On red LED
- Bypass Run green LED
- Freeway/Firestat interlock
- Form C: AFC detected fault contact
- Modbus™ RJ-45 communication port
- Smoke purge and damper control relays
- Circuit breaker disconnected
- Optional line disconnect switch or line contactor
- Optional full text keypad
- Optional non-bypass power circuit
S-Flex enclosed variable speed drives

Specifications

Electrical & Environmental

<table>
<thead>
<tr>
<th>Input</th>
<th>Voltage (V)</th>
<th>Frequency (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement power factor</td>
<td>Approx. 0.96%</td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>3-Phase AC 208/240/480 V</td>
<td></td>
</tr>
<tr>
<td>Frequency range of the power converter</td>
<td>Hertz</td>
<td></td>
</tr>
<tr>
<td>Configurable switching frequency</td>
<td>5 Hz</td>
<td></td>
</tr>
<tr>
<td>Speed reference</td>
<td>60 Hz</td>
<td></td>
</tr>
<tr>
<td>Reference sample time</td>
<td>2 ms</td>
<td></td>
</tr>
<tr>
<td>Acceleration and deceleration ramps</td>
<td>0.1 s to 99.9 s</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>Typically greater than 95%</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental Specifications

Endorse type

- Drive not mounted on DIN rail
  - VFD Type 1

Vibration resistance (Power converter only)

- According to IEC 60068-2-6:
  - 1.5 mm/s peak to peak from 3 to 13 Hz
  - 1 g from 13 to 150 Hz

Shock resistance (Power converter only)

- 15 g for 11 ms conforming to EN/IEC 60068-2-27

Maximum ambient pollution

- Pollution degree 2 per NEMA ICS-1 and IEC 60664-1

Environmental conditions use

- IEC 60721-3-3 classes 3C1 and 3S2

Relative humidity

- 95% with no condensation or dripping water, conforming to IEC 60068-2-3

Ambient air temperature around the device

- Operation: 10 °C to 40 °C operational; down to 50 °C with de-rating; See Installation manual for deratings
- Storage: -25...+70 °C with vent cover removed and without derating

Maximum operating altitude

- Up to 2,000 m (6,600 ft) without de-rating; derate nominal current by 1% for each additional 300 m (1,000 ft) up to 1,000 m (3,300 ft)

- Limit of 600 m (2,000 ft) if supplied by corner grounded distribution system

Conform to International Space Station Association guidelines

Conform to applicable NEMA ICS, NFPA, IEC, and ISO 9001 standards.

Seismic Certification

- IEC, NFPA 5050 and ASCE7
- IEC/ES AC 106[1]

Operating position

- Maximum permanent angle in relation to the normal vertical mounting position

(1) Above 12 kHz derate the drive per the graphs in the Altivar 212 Installation Guide, S1A53832.

With bypass

Non-Bypass Power Circuit W

I/O & Control Specifications

- Functions
- Description
- Customer terminals

With bypass

Bypass Power Circuit Y

I/O & Control Specifications

- Functions
- Description
- Customer terminals

Without bypass

S-Flex enclosed variable speed drives

Specifications

I/O & Control

- Functions
- Description
- Customer terminals

- With bypass

- Without bypass

(1) Factory set for current control. To change the input VIA to voltage control, see Altivar 212 Programming and Operation Guide, S1A53838.
S-Flex enclosed variable speed drives

**Specifications**

**Electrical & Environmental**

<table>
<thead>
<tr>
<th>Input</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft encoder</td>
<td>299 Vac ± 10%, 250 Vac ± 10%, 480 Vac ± 10%</td>
</tr>
</tbody>
</table>

**Displacement power factor**

Approximately 0.98%

**Output voltage**

- 3-phase output, maximum voltage equal to input voltage

**Frequency range of the power converter**

- 50 Hz (factory setting of 60 Hz maximum)

**Configurable switching frequency**

- 4 kHz: adjustable from 0 to 16 kHz

**Motor protection**

Class 10 and Class 20 overload protection with bypass in addition to controller internal

**Acceleration and deceleration ramps**

- 0.1 s to 999.9 s (adjustable in 0.1 s increments)

**Reference sample time**

- 2 ms

**Efficiency**

- V/f: determined by motor slip, typically 3%
- SLFV (sensorless flux vector): 1%

**Speed resolution in analog reference**

- 1 Hz

**Electrical isolation**

- Galvanic isolation between power and control (inputs, outputs and power supplies)

**Current limit**

- 150% of nominal drive full-load amperage (FLA) for 60 s

**Inputs and outputs**

- Two multifunction programmable logic inputs
- Two analog inputs: VIA (4 mA to 20 mA or 0 V to 10 V), VIB (0 V to 10 V)
- Two analog outputs: 0 mA to 20 mA (voltage output), 0–7 range with keypad display, manual speed control via keypad

**Reference sample time**

- 2 ms

**Acceleration and deceleration ramps**

- 0.1 s to 999.9 s (adjustable in 0.1 s increments)

**Motor protection**

Class 10 and Class 20 overload protection with bypass in addition to controller internal electronic thermal protection

**Keypad display**

Self-diagnosis with status messages

- 4-line/20-character LED display (standard)
- Full-function keypad, 8 languages (optional)

**Environmental Specifications**

**Endorse type**

- Drive not mounted on DIN rail

**Vibration resistance**

- Drive not mounted on DIN rail

**Shock resistance**

- Drive not mounted on DIN rail

**Maximum ambient temperature**

- 0°C to 40°C (non-condensing environment)

**Humidity**

- 10% to 95% with no condensation or dripping water, conforming to EN 60721-3-3 classes 3C1 and 3S2

**Altitude**

- 0 to 2,000 m (up to 3,300 ft) without de-rating, de-rate nominal current by 1% for each additional 330 ft (100 m) up to 10,000 ft (3,000 m)

**Pollution degree**

- 2 per NEMA ICS-1 and IEC 60664-1

**Operating position**

- Maximum permanent angle in relation to normal vertical mounting position

**Specifications I/O & Control**

**Bypass Power Circuit Y**

**I/O & Control Specifications**

**With bypass**

- Auto Start Contact: AFC Mode Run input
- Smoke Purge Relay: Remove Jumper
- System Run Auxiliary Contact: Closes on Motor Running (AFC or BYP)
- AFC Trip Auxiliary Contact: Closes on AFC Trip
- Smoke Purge Relay: 120 Vac to Emerge Coil
- Open Damper Signal: Closes when Run Signal Provided

**Non-Bypass Power Circuit W**

**I/O & Control Specifications**

**Without bypass**

- Auto Start Contact: AFC Mode Run input
- Freeze/Firestat: Remove Jumper / Add Interlock
- AFC Speed Reference: AFC Speed Reference
- AFC Trip Auxiliary Contact: Closes on AFC Trip
- Smoke Purge Relay: 120 Vac to Emerge Coil
- Open Damper Signal: Closes when Run Signal Provided

**Additional Specifications**

- 1.5 g from 13 to 150 Hz
- 1 g from 13 to 150 Hz
- 1.5 mm peak to peak from 3 to 13 Hz
- Factory set for current control. To change the input VIA to voltage control, see Altivar 212 Programming and Operation Guide.
### S-Flex enclosed drives, variable speed drives

#### Selection Tables 208/230 Vac

<table>
<thead>
<tr>
<th>Power circuit</th>
<th>Input voltage (Vac)</th>
<th>kW</th>
<th>Input current (A)</th>
<th>Output current (A)</th>
<th>Max. output current 60 s (A)</th>
<th>Total dissipated power at rated load (W)</th>
<th>S-Flex catalog number(s)</th>
<th>Weight (lb)</th>
<th>Frame size (mm)</th>
<th>Power converter part number(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N06</td>
<td>120</td>
<td>0.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>150</td>
<td>ATV12H075M3X</td>
<td>5.2</td>
<td>23.587</td>
<td>A</td>
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<tr>
<td>N06</td>
<td>120</td>
<td>1</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>250</td>
<td>ATV12H15M3X</td>
<td>12.532</td>
<td>55.349</td>
<td>B</td>
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<tr>
<td>N06</td>
<td>120</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>300</td>
<td>ATV12H30M3X</td>
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<tr>
<td>N06</td>
<td>120</td>
<td>5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>400</td>
<td>ATV12H45M3X</td>
<td>35.956</td>
<td>111.3</td>
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<tr>
<td>N06</td>
<td>120</td>
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<td>15</td>
<td>15</td>
<td>15</td>
<td>500</td>
<td>ATV12H75M3X</td>
<td>52</td>
<td>111.3</td>
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<td>N06</td>
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<td>2.2</td>
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<td>E</td>
</tr>
</tbody>
</table>

#### Options

- **Communication set-up options**
  - A06 BACom Card
  - A07 Drive input disconnect
- **Miscellaneous options**
  - N06 LiWorks Card
  - N07 Line contactor
  - N08 Motosys N2 Card
  - N09 Apogee P1 Card
  - N10 Modbus

#### Dimensions

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>W x H x D</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6.714 x 40.375 x 7.895</td>
<td>221.3 x 1025 x 200.5</td>
</tr>
<tr>
<td>B</td>
<td>12.215 x 45.143 x 7.895</td>
<td>310.3 x 1146.8 x 200.5</td>
</tr>
<tr>
<td>C</td>
<td>15.52 x 62.06 x 10.915</td>
<td>318.5 x 1567 x 277.3</td>
</tr>
<tr>
<td>D</td>
<td>15.243 x 64.9 x 11.915</td>
<td>387.5 x 1648.5 x 322.7</td>
</tr>
</tbody>
</table>

### S-Flex enclosed drives, variable speed drives

#### Selection Tables 460 Vac

<table>
<thead>
<tr>
<th>Power circuit</th>
<th>Input voltage (Vac)</th>
<th>kW</th>
<th>Input current (A)</th>
<th>Output current (A)</th>
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<tr>
<td>N06</td>
<td>208</td>
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<td>0.75</td>
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<td>1</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
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#### Options

- **Communication set-up options**
  - A06 BACom Card
  - A07 Drive input disconnect
- **Miscellaneous options**
  - N06 LiWorks Card
  - N07 Line contactor
  - N08 Motosys N2 Card
  - N09 Apogee P1 Card
  - N10 Modbus

#### Dimensions

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>W x H x D</th>
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<tbody>
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<td>C</td>
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<td>D</td>
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</table>
### S-Flex enclosed variable speed drives

#### 208/230 Vac

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<thead>
<tr>
<th>A²</th>
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<th>A³</th>
<th>A⁴</th>
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#### 230 Vac

<table>
<thead>
<tr>
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<th>A¹</th>
<th>A³</th>
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<th>S-Flex catalog number(s)¹⁰</th>
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<th>Frame size</th>
<th>Power converter part number(s)¹⁰</th>
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</table>

### Options

**Communication set-up options**

- A06 BACnet Card
- A07 Modbus

**Miscellaneous options**

- B06 LonWorks Card
- B07 Line Contactor
- C06 Metasys N2 Card
- C07 AC line reactor
- D06 Apogee P1 Card
- D07 Full text keypad
- E06 Modbus
- F07 AC line reactor

### Dimensions

**Size** | **W x H x D**
--- | ---
A | 8.714 x 40.375 x 7.896
B | 10.215 x 48.123 x 9.250
C | 12.52 x 62.006 x 10.915
D | 15.243 x 64.9 x 11.915

### Power Range

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<table>
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<td>75</td>
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</table>

### Notes

1. Power converters ATV212H401M3X, ATV212H402M3X, ATV212H403M3X at 208 Vac or 230 Vac are operating at a switching frequency of 12 kHz, and at 460 V (100%) - 60 Hz temperature and 500°F (260°C) - 486°C operating at a switching frequency of 12 kHz, and at 460 V (100%) - 60 Hz temperature.
2. Selection of the next right size drive is recommended. The duty cycle does not exceed 60% (36 s for a 60 s cycle) for switching frequency between 13 kHz and 16 kHz, select the next largest size drive. If the duty cycle does not exceed 60% (36 s for a 60 s cycle) for a switching frequency between 13 kHz and 16 kHz, select the next largest size drive.
3. The table indicates that the catalog number can end in "F" for an S-Flex drive with full voltage bypass or in "B" for an S-Flex drive without bypass.
4. Select the output current based on the max. input current of the motor FLA, whichever is greater.
5. Grids shown in the table are installed in S202/212 controllers.
S-Flex enclosed variable speed drives

### Accessories & Options

**Optional LonWorks communication card**

The Altivar 212 drive can also be connected to the LonWorks network by using the communication card (4) available as an option. It is connected by replacing the standard card (3) on the drive.

The connections are identical to those on the standard card:

- An RJ45 communication port for the Modbus serial link: This network port is mainly assigned to the remote graphic display keypad (Drive Navigator).

It is also used to connect:

- The Multi-Loader configuration tool
- The Bluetooth® serial link
- A Magelis industrial HMI terminal
- A screw terminal block for the Modbus serial link and the LonWorks network (optimized solution for daisy chain connection).

This screw terminal block is assigned to control and signalling by a PLC or by another type of controller.

The Altivar 212 drive can be controlled using the LonWorks 6010 (Variable Speed Motor Drive) and LonWorks 0000 (Node Object) profiles.

---

**LonWorks communication card VW3 A212 12**

Replacement of the drive standard card (3) with the Lonworks communication card (4)

---

**LonWorks Communication**

All the drive functions can be accessed via the network:

- Control
- Monitoring
- Adjustment
- Configuration

The speed control and reference may come from different sources:

- I/O terminals
- Communication network
- Drive Navigator

The advanced functions of the Altivar 212 enable switching of these drive control sources to be managed in accordance with the application requirements.

Communication is monitored according to criteria specific to each protocol.

However, regardless of the protocol, it is possible to configure how the drive responds to a communication fault:

- Freewheel stop, stop on ramp or braked stop
- Maintain last command received

---

**Description**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LONWORKS communication card</td>
<td>VW3A21212</td>
<td>0.4</td>
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</table>

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**iPad programming**

The iPad application can perform the following programming actions:

- Create parameter files
- Validate drive configurations
- Upload, download or clone drive settings
- Retain digital file copies of drive settings
- Links to all product information embedded in app

---

For all other S-Flex ATV212 accessories and options refer to pages 20 - 27.
S-Flex enclosed variable speed drives

Accessories & Options

Optional LonWorks communication card

The Altivar 212 drive can also be connected to the LonWorks network by using the communication card (4) available as an option. It is connected by replacing the standard card (3) on the drive.

The connections are identical to those on the standard card:
- An RJ45 communication port for the Modbus serial link.
- This network port is mainly assigned to the remote graphic display keypad (Drive Navigator).

It is also used to connect:
- The Multi-Loader configuration tool
- A Magelis industrial HMI terminal

- A screw terminal block for the Modbus serial link and the LonWorks network (optimized solution for daisy chain connection).
- This screw terminal block is assigned to control and signalling by a PLC or by another type of controller.

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LonWorks Communication

All the drive functions can be accessed via the network:
- Control
- Monitoring
- Adjustment
- Configuration

The speed control and reference may come from different sources:
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- Drive Navigator

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However, regardless of the protocol, it is possible to configure how the drive responds to a communication fault:
- Freewheel stop, stop on ramp or braked stop
- Maintain last command received

<table>
<thead>
<tr>
<th>Description</th>
<th>Part number</th>
<th>Weight</th>
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<tr>
<td>LONWORKS communication card</td>
<td>VW3A21212</td>
<td>0.4</td>
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iPad programming

The iPad application can perform the following programming actions:
- Create parameter files
- Validate drive configurations
- Upload, download or clone drive settings
- Retain digital file copies of drive settings
- Links to all product information embedded in app

For all other S-Flex ATV212 accessories and options refer to pages 20 - 27.
### Printed Circuit Board Testing
Printed circuit boards used in the assembly of the ATV212 undergo testing as a part of the board assembly. These tests include:
- In-circuit, component level testing
- Functional power-on testing
- Thermal-cycle stress testing
- High potential test applied to high voltage boards

### Diellectric Testing (Hi-Pot Test)
This test verifies the dielectric withstand between customer connection points and ground to validate that the required isolation barriers are intact. Isolation barriers are typically tested for a duration of one (1) second during which a high voltage is applied according to IEC 61800-5-1 standard. This station is also used to verify placement of the power circuit connections.

### Preliminary memory and functional testing
During this test, the unit's on-board communication port is utilized to read internal memory and set aside a portion of memory to track the processes performed on the drive and its main components. Each unit is checked and product conformance status is recorded at each test station. Appropriate conformance information is carried in nonvolatile memory within the unit. The sequence of testing is monitored. Each test station requires a successful bar code scan on entry to ensure each drive has successfully completed any prerequisite test stations.

In addition to the processes and procedures detailed below, each test station has a visual quality inspection check list. This check list includes a physical inspection for proper connections, power component polarities, proper assembly tolerances, mechanical integrity and proper documentation.

<table>
<thead>
<tr>
<th>Outline of Test Process and Procedures</th>
<th>Unit operation and burn-in testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printed circuit board testing, dielectric testing, preliminary memory and functional test, unit operation with burn-in testing, and final verification testing are conducted at various points in the manufacturing process for each drive. All aspects of these tests during the assembly are logged electronically for internal tracking purposes. Each unit is checked and product conformance status is recorded at each test station. Appropriate conformance information is carried in nonvolatile memory within the unit. The sequence of testing is monitored. Each test station requires a successful bar code scan on entry to ensure each drive has successfully completed any prerequisite test stations. In addition to the processes and procedures detailed below, each test station has a visual quality inspection check list. This check list includes a physical inspection for proper connections, power component polarities, proper assembly tolerances, mechanical integrity and proper documentation.</td>
<td></td>
</tr>
<tr>
<td><strong>Printed Circuit Board Testing</strong></td>
<td><strong>Burn-in testing involves four aspects - (I) sample plan, (II) thermal profile, (III) electrical cycling, and (IV) load cycling.</strong> Each will vary slightly by the equipment available at each production facility and by the current quality results experienced by each production facility.</td>
</tr>
<tr>
<td>Printed circuit boards used in the assembly of the ATV212 undergo testing as a part of the board assembly. These tests include:</td>
<td><strong>(I) Sample Plan</strong></td>
</tr>
<tr>
<td>- In-circuit, component level testing</td>
<td>- Burn-in is sampled at a rate that varies from 5% to 100%. This rate is based on current quality results for each production facility. Each production facility is required to burn-in at sample rates determined by the following model.</td>
</tr>
<tr>
<td>- Functional power-on testing</td>
<td><strong>(II) Thermal Profile</strong></td>
</tr>
<tr>
<td>- Thermal-cycle stress testing</td>
<td>- Constant elevated temperature of 60°C for two hours during which the drive is subjected to electrical cycling for the entire duration of the thermal profile.</td>
</tr>
<tr>
<td>- High-potential test applied to high voltage boards</td>
<td><strong>(III) Electrical Cycles</strong></td>
</tr>
<tr>
<td><strong>Diellectric Testing (Hi Pot Test)</strong></td>
<td>- The electrical cycle runs concurrently with the thermal profile. An electrical cycle energizes and de-energizes the drive by connecting and removing AC input power. The drive is energized for the duration of a load cycle (typically 4 minutes) and de-energized to allow the drive power supply to shut down (typically 40 seconds). This cycle repeats continuously during the portions of the thermal profile indicated above. This cycle is repeated continuously during the thermal profile.</td>
</tr>
<tr>
<td>This test verifies the dielectric withstand between customer connection points and ground to validate that the required isolation barriers are intact. Isolation barriers are typically tested for a duration of one (1) second during which a high voltage is applied according to IEC 61800-5-1 standard. This station is also used to verify placement of the power circuit connections.</td>
<td><strong>(IV) Load Cycles</strong></td>
</tr>
<tr>
<td><strong>Preliminary memory and functional testing</strong></td>
<td>- Drives are connected to an inertial motor load during burn-in. When the drive is energized, the drive is cycled between high speed forward and reverse operations. Load cycles are made at a minimum interval of 10 seconds. Acceleration and deceleration rates are 0.1s (minimum). The rates are selected to maximize transition stress.</td>
</tr>
<tr>
<td>During this test, the unit's on-board communication port is utilized to read internal memory and set aside a portion of memory to track the processes performed on the drive and its main components. Each tracked process must have been completed successfully to proceed. These include:</td>
<td><strong>Monitoring during burn-in cycle</strong></td>
</tr>
<tr>
<td>- Supplier performed tests of printed circuit boards with on-board memory.</td>
<td>- The drive detected fault register and drive speed are monitored during the load cycle. If the drive does not reach the commanded speed then it stops and then indicates that it did not pass the test.</td>
</tr>
<tr>
<td>- Successful drive hi-pot test</td>
<td><strong>Final verification testing</strong></td>
</tr>
<tr>
<td>A preliminary test is run to verify:</td>
<td>This test validates proper operation after burn-in and prepares the drive settings for customer shipment. The following checks are made:</td>
</tr>
<tr>
<td>- heatsink ground screw presence</td>
<td>- DC bus pre-charge check</td>
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<tr>
<td>- FR4 FR4 jumper setting</td>
<td>- Communication port test</td>
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<tr>
<td>- DC bus jumper presence</td>
<td>- Product model verification</td>
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<tr>
<td>- EEPROM test</td>
<td>- 7 segment LED display check</td>
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<td>- Product rating verification</td>
<td>- DC charger LED check</td>
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<tr>
<td>- Initial rating verification</td>
<td>- CPU version check</td>
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<td>- Analog input calibration</td>
<td>- DC Bus level check</td>
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<td>- Analog output calibration</td>
<td>- Fan operation test</td>
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<td>- Self test (verification of the display board and control terminal board)</td>
<td>- Initial load characteristic check</td>
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<td>- Pre-motor test</td>
<td>- Overcurrent test</td>
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<td>- Brake transistor on check</td>
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<td>- Salt factory default configuration</td>
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</table>

This document provides information regarding the quality assurance processes and procedures that are in place for the manufacturing of the Altivar 212. These are in place to monitor and confirm the quality of the product line that has been designed in from the outset.
Quality Assurance

This document communicates a summary of the processes, procedures & quality assurance that are in place for the manufacturing of the Altivar 212. Altivar 212 drives are produced in ISO certified facilities. Customers can be assured that these processes and procedures are followed. Audits conducted by third party representatives verify documented processes and procedures are followed and provide certification to ISO 14001. Schneider Electric utilizes quality assurance processes and procedures to verify the integrity of components and the assembly process. Data is gathered on each unit and tracked via the unique serial number of each unit during the manufacturing process. The document was not intended to imply this data is available in a format that could be easily communicated externally nor that a written report is generated for each product.

Outline of Test Process and Procedures

Printed circuit board testing, dielectric testing, preliminary memory and functional test, unit operation with burn-in testing, and final verification testing are conducted at various points in the manufacturing process for each drive. All aspects of these tests during the assembly are logged electronically for internal tracking purposes. Each unit is checked and product conformance status is recorded at each test station. Appropriate conformance information is carried in nonvolatile memory within the unit. The sequence of testing is monitored. Each test station requires a successful bar code scan on entry to ensure each drive has successfully completed any prerequisite test stations.

In addition to the processes and procedures detailed below, each test station has a visual quality inspection check list. This check list includes a physical inspection for proper connections, power component polarities, proper assembly torques, mechanical integrity and proper documentation.

Printed Circuit Board Testing

Printed circuit boards used in the assembly of the ATV212 undergo testing as a part of the board assembly. These tests include:
- In-circuit, component level testing
- Functional power-on testing
- Thermal-cycle stress testing
- High potential test applied to high voltage boards

Dielectric Testing (Hi Pot Test)

This test verifies the dielectric withstand between customer connection points and ground to validate that the required isolation barriers are intact. Isolation barriers are typically tested for a duration of one (1) second during which a high voltage is applied according to IEC 61800-5-1 standard. This station is also used to verify placement of the power circuit connections.

Preliminary memory and functional testing

During this test, the unit’s on-board communication port is utilized to read internal memory and set aside a portion of the power circuit connections. During this test, the unit’s on-board communication port is utilized to read internal memory and set aside a portion of the power circuit connections. The unit detected fault register and drive speed are monitored during the load cycle. If the drive does not reach the commanded speed then it stops and then indicates that it did not pass the test.

Final verification testing

This test validates proper operation after burn-in and prepares the drive settings for customer shipment. The following checks are made:
- DC bus pre-charge check
- Communication port test
- Product model verification
- 7 segment LED display check
- DC charge LED check
- CPU version check
- DC bus level check
- Fan operation test
- Terminal load characteristic check
- Overcurrent test
- Ground fault trip test
- Brake transistor off check
- Brake transistor on check
- Set factory default configuration

This document provides information regarding the quality assurance processes and procedures that are in place for the manufacturing of Altivar 212. These are in place to monitor and confirm quality of the product line that has been designed in from the outset.

Unit operation and burn-in testing

Burn-in testing involves four aspects - (I) sample plan, (II) thermal profile, (III) electrical cycling, and (IV) load cycling. Each will vary slightly by the equipment available at each production facility and by the current quality results experienced by each production facility.

(I) Sample Plan

Burn-in is sampled at a rate that varies from 5% to 100%. The rate is based on current quality results for each production facility. Each production facility is required to burn-in at sample rates determined by the following model.

(II) Thermal Profile

Constant elevated temperature of 60°C for two hours during which the drive is subjected to electrical cycling for the entire duration of the thermal profile.

(III) Electrical Cycles

The electrical cycle runs concurrently with the thermal profile. An electrical cycle energizes, de-energizes the drive by connecting and removing AC input power. The drive is energized for the duration of a load cycle (typically 4 minutes) and de-energized to allow the drive power supply to shut down (typically 40 seconds). This cycle repeats continuously during the portions of the thermal profile indicated above. This cycle is repeated continuously during the thermal profile.

(IV) Load Cycles

Drives are connected to an inertial motor load during burn-in. When the drive is energized, the drive is cycled between high speed forward and reverse operations. Load cycles are made at a minimum interval of 10 seconds. Acceleration and deceleration rates are 0.1s (minimum). The rates are selected to maximize transition stress.

Monitoring during burn-in cycle

The drive detected fault register and drive speed are monitored during the load cycle. If the drive does not reach the commanded speed then it stops and then indicates that it did not pass the test.
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- Cut costs and increase savings
- Improve your return on investment

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E-mail drive.products.support@us.schneider-electric.com
Fax 919-217-4908

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