
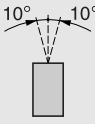


Environmental characteristics		
Conformity to standards		Altivar 11 drives have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control devices (IEC, EN), in particular: EN 50178, EMC immunity and EMC conducted and radiated emissions
EMC immunity		<ul style="list-style-type: none"> ■ IEC/EN 61000-4-2 level 3 ■ IEC/EN 61000-4-3 level 3 ■ IEC/EN 61000-4-4 level 4 ■ IEC/EN 61000-4-5 level 3 (power section access) ■ IEC/EN 61800-3, environments 1 and 2
EMC conducted and radiated emissions for drives	All	■ IEC/EN 61800-3, environments: 2 (industrial supply) and 1 (public supply) in restricted distribution
	ATV 11●U05M2E to ATV 11●U18M2E ATV 11●U05M2E347 to ATV 11●U18M2E347	■ EN 55011, EN 55022 class B, 2 to 12 kHz for motor cable lengths ≤ 5 m and class A (group 1), 2 to 16 kHz for lengths y 10 m
EMC conducted emissions for drives	ATV 11●U29M2E to ATV 11●U41M2E ATV 11●U29M2E347 to ATV 11●U41M2E347	■ EN 55011, EN 55022 class B, 4 to 16 kHz for motor cable lengths ≤ 5 m and class A (group 1), 4 to 16 kHz for lengths y 10 m
	ATV 11HU05M2E to ATV 11HU41M2E ATV 11HU05M2E347 to ATV 11HU41M2E347	■ With additional EMC filter: EN 55011, EN 55022 class B, 2 to 16 kHz for motor cable lengths ≤ 20 m and class A (group 1), 2 to 16 kHz for lengths y 50 m
EMC conducted emissions for drives	ATV 11HU05●●U to ATV 11HU41●●U ATV 11HU05●●A to ATV 11HU41●●A	■ With additional EMC filter: EN 55011, class B, 2 to 16 kHz for motor cable lengths ≤ 5 m and class A (group 1), 2 to 16 kHz for lengths y 20 m
CE marking		The drives have CE marking in accordance with the European directives on low voltage (2006/95/EC and 93/68/EEC) and EMC (89/336/EEC).
Product certifications		UL, CSA, N998 and C-TICK
Degree of protection		IP 20
Vibration resistance	Drive without  rail option	Conforming to IEC/EN 60068-2-6: - 1.5 mm peak from 3 to 13 Hz - 1 gn from 13 to 200 Hz
Shock resistance		15 gn for 11 ms conforming to IEC/EN 60068-2-27
Relative humidity		% 5...93 without condensation or dripping water conforming to IEC 60068-2-3
Ambient temperature around the unit	Storage	°C - 25...+ 65
	Operation	°C - 10...+ 40 - 10...+ 50: by removing the protective cover from the top of the drive Up to +60 with current derating of 2.2% per °C above 50°C
Maximum operating altitude		m 1000 without derating (above this, derate the current by 1% per additional 100 m)
Operating position Maximum permanent angle in relation to the normal vertical mounting position		

Drive characteristics		
Output frequency range	Hz	0...200
Switching frequency	ATV 11●U●●●●E/A/U	2...16 kHz (1)
	ATV 11●U●●M2E347	2...12 kHz (1)
Speed range		1...20
Transient overtorque		150...170% of the nominal motor torque
Braking torque		<ul style="list-style-type: none"> ■ 20% of nominal motor torque without braking resistor at no-load with the "deceleration ramp adaptation" function enabled ■ 80% of the nominal motor torque with braking resistor (available as an option) at no-load ■ Up to 150% of the nominal motor torque with braking resistor (available as an option) at high inertia
Maximum transient current		<ul style="list-style-type: none"> ■ 150% of the nominal drive current for 60 seconds for range E, A and E347 drives ■ 137...150% for range U drives
Voltage/frequency ratio		Sensorless flux vector control with PWM type motor control signal (2) Factory-set for most constant torque applications
Frequency loop gains		Factory-set with the speed loop stability and gain Possible correction for machines with high resistive torque or high inertia, or for machines with fast cycles
Slip compensation		Preset in factory, depending on the drive rating (adjustment possible)

(1) If operation above 4 kHz needs to be continuous, the nominal drive current should be derated by 10% for 8 kHz, 20% for 12 kHz and for E, A and U ranges, 30% for 16 kHz.

(2) Pulse width modulation

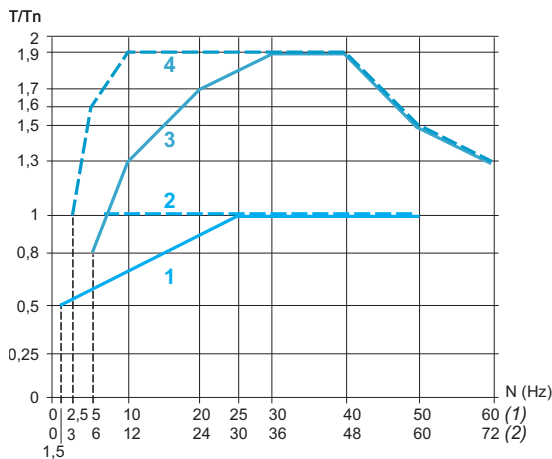
Electrical characteristics			
Power supply	Voltage	V	200 - 15% to 240 +10% single phase for ATV 11●U●●M2● 200 - 15% to 240 +10% single phase for ATV 11●U●●M2E347 200 - 15% to 230 + 15% three phase for ATV 11●U●●M3● 100 - 15% to 120 +10% single phase for ATV 11●U●●F1●
	Frequency	Hz	50 ± 5% or 60 ± 5%
	Isc	A	≤ 1000 (prospective short-circuit current at the connection point) for single phase power supply ≤ 5000 (prospective short-circuit current at the connection point) for three phase power supply
Output voltage			Maximum three phase voltage equals: - the line supply voltage for ATV 11●U●●M●● - double the line supply voltage for ATV 11●U●●F1●
Maximum connection capacity of the power supply, the motor and the braking unit	ATV 11●U05●●●, ●U09●●●, ●U12M●●, ●U18M●● drives		1.5 mm ² (AWG 14)
	ATV 11HU05M2E347, ●U09M2E347, ●U12M2E347, ●U18M2E347 drives		
	ATV 11HU18F1●, HU29●●●, HU41●●●, HU29M2E347, HU41M2E347 drives		4 mm ² (AWG 10)
Maximum length of motor cables		m	50, shielded cable 100, unshielded cable
Electrical isolation			Electrical isolation between power and control (inputs, outputs, power supplies)
Available internal supplies			Short-circuit and overload protection: - One +5 V (0/+5%) supply for the reference potentiometer (2.2 to 10 kW), maximum current 10 mA - One + 15 V (± 15%) supply for the control inputs, maximum current 100 mA
Analog input AI1			1 configurable analog input Max. sampling time: 20 ms, resolution 0.4%, linearity ± 5%: - Voltage 0-5 V (internal power supply only) or 0-10 V, impedance 40 kW - Current 0-20 mA or 4-20 mA (without addition of a resistor), impedance 250 W
Logic inputs LI			4 assignable logic inputs, impedance 5 kW + 15V internal or 24V external power supply (min. 11 V, max. 30 V) Factory-set with 2-wire control in "transition" mode for machine safety reasons on the Europe and America ranges: - LI1: Forward - LI2: Reverse - LI3/LI4: 4 preset speeds - Local controls for the Asia range and the pump range Multiple assignment makes it possible to mix several functions on one input (for example, LI1 assigned to forward and preset speed 2, LI3 assigned to reverse and preset speed 3)
	Positive logic E/U/A/E347 ranges		State 0 if < 5 V, state 1 if > 11 V Max. sampling time: 20 ms
	Negative logic A/E347 ranges		Available by programming only on the Asia range and pump ranges State 0 if > 11 V or logic input not wired, state 1 if < 5 V Max. sampling time: 20 ms
DO Output			Factory setting: - PWM (1) open collector output at 2 kHz. Can be used for electromagnetic galvanometer - Max. current 10 mA - Output impedance 1 kW, linearity ± 1%, max. sampling time 20 ms Assignable as logic output: - Open collector logic output, output impedance 100 W, 50 mA max. - Internal voltage (see Available internal supplies above) - External voltage 30 V max.: 30 mA
Relay outputs RA-RC			1 protected relay logic output (default open contact). Minimum switching capacity: 10 mA for 24 V --- Maximum switching capacity: - On resistive load (cos j = 1 and L/R = 0 ms): 5 A for 250 V ~ or 30 V --- - On inductive load (cos j = 0.4 and L/R = 7 ms): 2 A for 250 V ~ or 30 V ---
Maximum I/O connection capacity			1.5 mm ² (AWG 14)

(1) Pulse width modulation

Electrical characteristics (continued)

Acceleration and deceleration ramps		Ramp profiles: linear from 0 to 99.9 s Automatic adaptation of deceleration ramp time if braking capacities exceeded, possible inhibition of this adaptation (use of braking resistor unit)
Braking to a standstill		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 I _n
Main drive protection and safety features		<ul style="list-style-type: none"> ■ Thermal protection against overheating ■ Protection against short-circuits between output phases ■ Overcurrent protection between output phases and earth on power-up only ■ Line supply overvoltage and undervoltage safety features ■ Input phase loss safety feature, for three phase supply
Motor protection (see page 60255/9)		Thermal protection integrated in drive by continuous calculation of I ² t. Thermal memory reset when powered off.
Insulation resistance to earth	MΩ	> 500 (electrical isolation)
Frequency resolution		Display units: 0.1 Hz Analog inputs: 10-bit A/D converter
Time constant for reference change	ms	5

Torque characteristics (typical curves)



The curves opposite define the available continuous torque and transient overtorque for both force-cooled and self-cooled motors. The only difference is in the ability of the motor to provide a high continuous torque at less than half the nominal speed.

- 1 Self-cooled motor: continuous useful torque
- 2 Force-cooled motor: continuous useful torque
- 3 Transient overtorque in factory settings (UFR = 50), with motor characteristics
- 4 Transient overtorque at UFR = 100 and motor characteristics

(1) 50 Hz nominal supply frequency
(2) 60 Hz nominal supply frequency

Special uses

Use with a motor with a different power rating to that of the drive

The device can power any motor which has a lower rating than that for which the drive was designed. For motor ratings slightly higher than that of the drive, check that the current taken does not exceed the continuous output current of the drive.

Connecting motors in parallel

The rating of the drive must be greater than or equal to the sum of the currents of the motors to be connected to the drive. In this case, it is necessary to provide external thermal protection for each motor using probes or thermal overload relays. If the number of motors connected in parallel is greater than or equal to 3, it is advisable to install a three phase choke between the drive and the motors.

Note: For choke product references, please consult your Regional Sales Office.

Switching the motor at the drive output

The drive can be switched when locked. The "catch-on-the-fly" (automatic catching a spinning load) function must be configured for this type of use.

Variable speed drives for asynchronous motors

Altivar 11

Combinations for customer assembly

Function: To protect persons and equipment from any level of overcurrent which may be encountered (overload or short-circuit).

The combinations shown below correspond to type 1 coordination:

Standard power ratings of three phase 4-pole 50/60 Hz motors	Speed drive Reference (1)	Circuit-breaker		Maximum short-circuit current Icu	Contactor Reference
		Telemecanique (2)	Adjustment range		
		Merlin Gerin	Rating		
kW			A	kA	
M1	A1	Q1			KM1
Single phase supply voltage: 100...120 V 50/60 Hz					
0.18	ATV 11HU05F1●	GV2 ME14 DT40	6...10 10	> 50 6	LC1 K09 LC1 K09
0.37	ATV 11●U09F1●	GV2 ME14 DT40	6...10 16	> 50 6	LC1 K09 LC1 K09
0.75	ATV 11HU18F1●	GV2 ME21 DT40	17...23 20	> 15 6	LC1 D25 LC1 D25
Single phase supply voltage: 200...240 V 50/60 Hz					
0.18	ATV 11HU05M2●, ATV 11HU05M2E347	GV2 ME08 DT40	2.5...4 6	> 50 6	LC1 K09 LC1 K09
0.37	ATV 11●U09M2●, ATV 11●U09M2E347	GV2 ME14 DT40	6...10 10	> 50 6	LC1 K09 LC1 K09
0.55	ATV 11●U12M2E, ATV 11●U12M2E347	GV2 ME14 DT40	6...10 10	> 50 6	LC1 K09 LC1 K09
0.75	ATV 11●U18M2●, ATV 11●U18M2E347	GV2 ME16 DT40	9...14 16	> 15 6	LC1 K12 LC1 K12
1.5	ATV 11HU29M2E, ATV 11HU29M2E347	GV2 ME20 DT40	13...18 20	> 15 6	LC1 D18 LC1 D18
1.5	ATV 11HU29M2U, ATV 11HU29M2A	GV2 ME21 DT40	17...23 20	> 15 6	LC1 D25 LC1 D25
2.2	ATV 11HU41M2●, ATV 11HU41M2E347	GV2 ME32 DT40	24...32 32	> 10 6	LC1 D32 LC1 D32
Three phase supply voltage: 200...230 V 50/60 Hz					
0.18	ATV 11HU05M3●	GV2 ME07 DT40	1.6...2.5 6	> 50 6	LC1 K06 LC1 K06
0.37	ATV 11●U09M3●	GV2 ME08 DT40	2.5...4 6	> 50 6	LC1 K06 LC1 K06
0.75	ATV 11●U18M3●	GV2 ME14 DT40	6...10 10	> 50 6	LC1 K09 LC1 K09
1.5	ATV 11HU29M3●	GV2 ME16 DT40	9...14 16	> 15 6	LC1 K12 LC1 K12
2.2	ATV 11HU41M3●	GV2 ME20 DT40	13...18 20	> 15 6	LC1 D18 LC1 D18

Combinations of circuit-breakers and add-on modules

DT40	Vigi TG40		
Rating (A)	Rating (A)	Type(3)	Sensitivity
6	25	A "si"	30 mA
10	25	A "si"	30 mA
16	25	A "si"	30 mA
20	25	A "si"	30 mA
32	40	A "si"	30 mA

Recommendations for special uses:

- All RH10/RH21/RH99/RHU residual current protection devices with separate sensors are compatible as long as the type and sensitivity of the add-on modules given in the table above are observed.
- It is advisable to connect one residual current differential safety device per drive. In this case, a type B device must not be located downstream of a type A or AC device.

(1) Replace the dots in the reference according to the type of drive required (see pages 60252/2 to 60252/4).

(2) Replace "ME" with "P" for rotary knob control.

Type 2 coordination is provided by combining a GV2 circuit-breaker with an LC1 D ●● contactor.

(3) For additional protection against direct contact, with a three phase power supply and access to the DC bus terminals (PA+/PC-), the add-on module must be type B with a sensitivity of 30 mA.