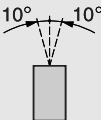


Soft starters for asynchronous motors

Altistart 48 soft start - soft stop units

Environment characteristics			
Conforming to standards			The electronic starters have been developed and performance tested in accordance with international standards, in particular with the starter product standard EN/IEC 60947-4-2
CE marking			Products have CE marking in accordance with the harmonised standard EN/IEC 60947-4-2.
Product certifications			UL, CSA, DNV, C-Tick, GOST, CCC, NOM 117, SEPRO, TCF
Degree of protection	ATS 48D17● to 48C11●		IP 20 (IP 00 in the absence of connections)
	ATS 48C14● to 48M12● (1)		IP 00
Vibration resistance			1.5 mm from 2 to 13 Hz, 1 gn from 13 to 200 Hz, conforming to IEC 60068-2-6
Shock resistance			15 gn for 11 ms, conforming to IEC 60068-2-27
Starter noise level (2)	ATS 48D32● to D47●	dBA	52
	ATS 48D62● to C11●	dBA	58
	ATS 48C14● to C17●	dBA	50
	ATS 48C21● to C32●	dBA	54
	ATS 48C41● to C66●	dBA	55
	ATS 48C79● to M12●	dBA	60
Fans	ATS 48D17● and D22●		Natural convection
	ATS 48D32● to M12●		Forced convection. The fans are activated automatically when a temperature threshold is reached. For flow rate: see page 60523/7
Maximum ambient pollution			Level 3, conforming to IEC 60664-1
Relative humidity			95 % without condensation or dripping water, conforming to IEC 60068-2-3
Ambient temperature around the device	Operation	°C	- 10...+ 40 without derating (between + 40 and + 60, derate the nominal current of the Altistart by 2 % for each °C)
	Storage	°C	- 25...+ 70, conforming to IEC 60947-4-2
Maximum operating altitude		m	1000 without derating (above this, derate the nominal current of the Altistart by 2.2 % for each additional 100 m). Limit to 2000 m
Operating position Maximum permanent angle in relation to the normal vertical mounting position			

Electrical characteristics			
Operating category			AC-53a, Conforming to IEC 60947-4-2
Three-phase supply voltage	ATS 48●●●Q	V	230 - 15 % ...415 + 10 %
	ATS 48●●●Y	V	208 - 15 % ...690 + 10 %
Frequency		Hz	50/60 ± 5 % (automatic) 50 or 60 ± 20 % (must be set)
Nominal starter current	ATS 48●●●Q	A	17...1200
	ATS 48●●●Y	A	17...1200
Motor power	ATS 48●●●Q	kW	4...630
	ATS 48●●●Y	kW/HP	5,5...900 / 5...1200
Voltage indicated on the motor rating plate	ATS 48●●●Q	V	230...415
	ATS 48●●●Y	V	208...690
Starter control circuit supply voltage	ATS 48●●●Q	V	220 - 15 % to 415 + 10 %, 50 / 60 Hz
	ATS 48●●●Y	V	110 - 15 % to 230 + 10 %, 50 / 60 Hz
Maximum control circuit consumption (with fans operating)	ATS 48D17● to C17●	W	30
	ATS 48C21● to C32●	W	50
	ATS 48C41● to M12●	W	80
Relay output (2 configurable outputs)			3 relay outputs (R1, R2, R3), normally open contacts 1 "N/O" Minimum switching capacity: 10 mA for ~ 6 V Maximum switching capacity on inductive load: 1.8 A for ~ 230 V and ~ 30 V (cos φ= 0.5 and L/R=20ms). Maximum nominal operating voltage ~ 400 V Factory setting: R1 assigned as the "fault relay" (configurable) R2 assigned as the "end of starting relay" to control the starter bypass relay R3 assigned as "motor powered" (configurable)

(1) Protective covers can be fitted to the power terminals of ATS 48C14● to C32● starters (see page 60530/3). ATS 48C41● to 48M12● starters have protection on the front panel and on the sides.

(2) Starters located 1 m away. The noise levels may change depending on the characteristics of the fans.

Soft starters for asynchronous motors

Altistart 48 soft start - soft stop units

Electrical characteristics (continued)		
Logic inputs LI (2 configurable inputs)		4 logic inputs, impedance 4.3 kΩ, isolated: Stop, Run, LI3, LI4 + 24 V power supply (maximum 30 V) I max. 8 mA State 0 if U < 5 V and I < 2 mA State 1 if U > 11 V and I > 5 mA
Internal source available		1 x + 24 V output, isolated and protected against short-circuits and overloads Accuracy ± 25%. Max. current 200 mA
Logic outputs LO (configurable)		2 logic outputs LO1 and LO2 with 0 V common, compatible with level 1 PLC, according to standard IEC 65A-68 + 24 V power supply (minimum: + 12 V, maximum: + 30 V) Maximum output current: 200 mA if supplied externally
Analogue output AO (configurable)		Current output 0-20 mA or 4-20 mA Maximum load impedance: 500 Ω Accuracy ± 5% of the maximum value
Input for PTC probe		Total resistance of probe circuit 750 Ω at 25°C, according to IEC 60 738-A
Maximum I/O connection capacity		2.5 mm ² (AWG 12)
Communication		RS 485 multidrop serial link integrated in the starter, for Modbus serial link, with RJ45 type connector Transmission speed 4800, 9600 or 19200 bps Maximum number of Altistart 48 connected: 18 Other uses: - connection to a remote terminal, - connection to a PC, - connection to other buses and networks via communication options.
Protection	Thermal	Built-in, starter and motor (calculated and/or thermal protection with PTC probes)
	Line protection	Phase failure, indicated by output relay
Current settings		The nominal motor current I _n can be adjusted from 0.4 to 1.3 times the starter nominal current. Adjustment of the maximum starting current from 1.5 to 7 times the motor I _n , limited to 5 times the starter nominal current.
Starting mode		By torque control with starter current limited to 5 I _n maximum Factory setting: 4 I _n for standard operation on 15 s torque ramp
Stopping mode	Freewheel stop	"Freewheel" stop (factory setting)
	Controlled stop on torque ramp	Programmed between 0.5 and 60 s (for pump applications)
	Braked stop	Controlled dynamically by the flux

Electromagnetic compatibility EMC (1)			
	Standards	Test levels	Examples (sources of interference)
Summary of immunity tests carried out with the Altistart 48	IEC 61000-4-2 level 3 Electrostatic discharge: - by contact, - in the air.	6 kV 8 kV	Contact off an electrically charged individual
	IEC 61000-4-3 level 3 Radiated electromagnetic fields	10 V/m	Equipment transmitting radio frequencies
	IEC 61000-4-4 level 4 Rapid electrical transients: - power supply cables, - control cables.	4 kV 2 kV	Opening/closing of a contactor
	IEC 61000-4-5 level 3 Shock wave: - phase/phase, - phase/earth.	1 kV 2 kV	-
	IEC 61000-4-12 level 3 Damped oscillating waves	1 kV - 1 MHz	Oscillating circuit on the line supply
Radiated and conducted emissions	According to IEC 60947-4-2, class A, on all starters		
	According to IEC 60947-4-2, class B, on starters up to 170 A: ATS 48D17● to 48C17●. Must be bypassed at the end of starting		

(1) The starters conform to product standard IEC 60947-4-2, in particular with regard to EMC. This standard ensures a level of immunity for products and a level of emitted interference. In steady state, the interference emitted is below that required by the standard. During acceleration and deceleration phases, low level loads may be affected by low frequency interference (harmonics). To reduce this interference, connect chokes between the line supply and the Altistart 48 (see page 60530/3).

Nota :

- Power factor correction capacitors can only be used upstream of the Altistart and only powered up at the end of starting.
- The starter must be earthed to conform to the regulations concerning leakage currents (≤ 30 mA). When the use of an upstream "residual current device" for protection is required by the installation standards, an AS-Interface type device must be used. Check its compatibility with the other protective devices. If the installation involves several starters on the same line supply, each starter must be earthed separately.

Soft starters for asynchronous motors

Altistart 48 soft start - soft stop units

Torque characteristics

Curves indicating changes in the torque depending on the starting current of a three-phase asynchronous motor.

Curves 1: direct line starting.

Curves 2: starting in current limiting mode.

Torque curve Ts1 indicates the total torque range available depending on the limiting current Is1.

Limiting the starting current Is to a preset value Is1 will reduce the starting torque Ts1 to a value which is almost equal to the square of currents Is1/Is.

Example:

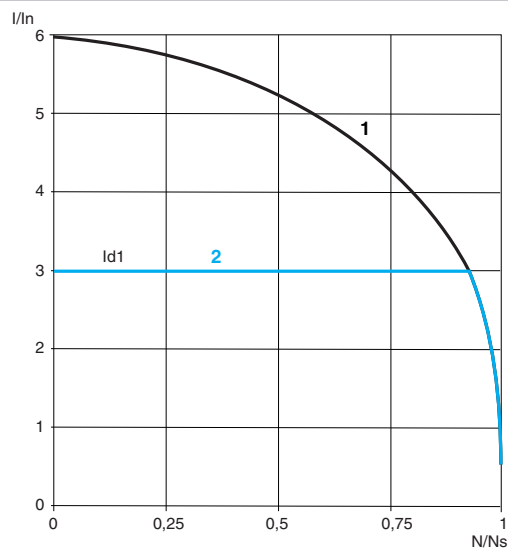
for motor characteristics: $T_s = 3 T_n$ for $I_s = 6 I_n$,

limit the current to $I_{s1} = 3 I_n$ (0.5 Is)

resulting in a starting torque $T_{s1} = T_s \times (0.5)^2 = 3 T_n \times 0.25 = 0.75 T_n$

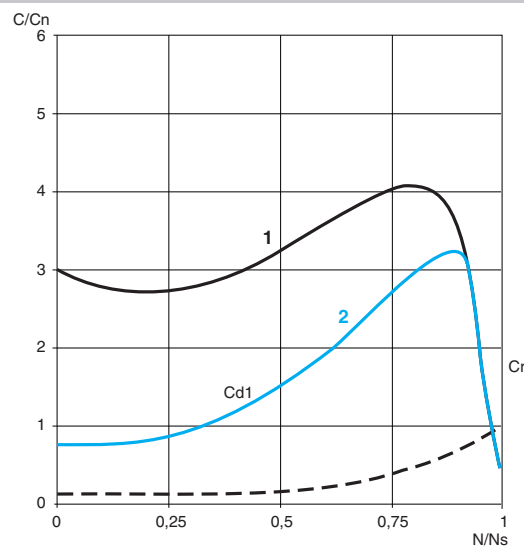
Starting current

- 1 Direct line starting current
- 2 Starting current limited to Is1



Starting torque

- 1 Direct line starting torque
- 2 Starting torque with current limited to Is1



Soft starters for asynchronous motors

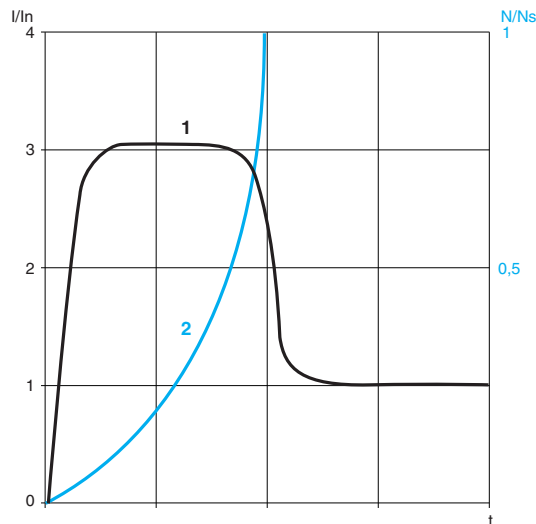
Altistart 48 soft start - soft stop units

Conventional starting using current limitation or voltage ramp

With current limitation I_{s1} , the accelerating torque applied to the motor is equal to the motor torque T_{s1} minus the resistive torque T_r .
The accelerating torque increases in the starting range as the speed changes and is at its highest at the end of acceleration (curve 2).
This characteristic means that the load is taken up very abruptly, which is not recommended for pump type applications.

Example of speed curve for starting with current limitation

- 1 Current applied to the motor (I/I_n)
- 2 Motor speed N/N_s



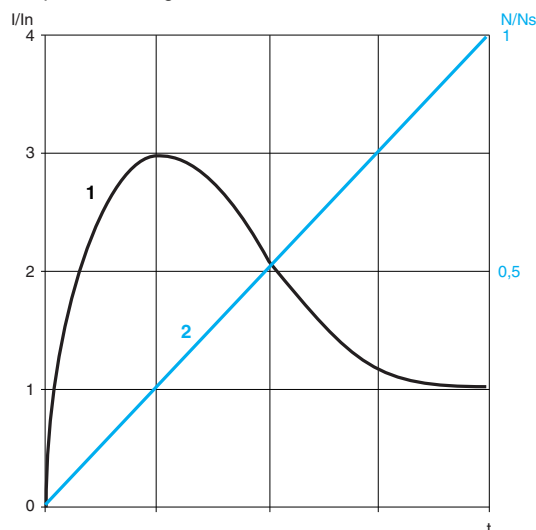
Starting with the Altistart 48

Torque control on the Altistart 48 applies the torque to the motor during the entire starting phase if the current required (curve 1) does not exceed the limiting current. The accelerating torque can be virtually constant over the entire speed range (curve 2).

It is possible to set the Altistart in order to obtain a high torque on starting for a rapid motor speed rise whilst limiting its temperature rise, and a lower accelerating torque at the end of starting for gradual loading. This control function is ideal for centrifugal pumps or for machines with high resistive torque on starting.

Example of speed curve for starting with torque control

- 1 Current applied to the motor (I/I_n)
- 2 Motor speed N/N_s



Stopping with the Altistart 48

- Freewheel stop: the motor comes to a freewheel stop.
- Decelerated stop: this type of stop is ideal for pumps and can be used to effectively reduce pressure surges. Torque control on the Altistart 48 reduces the effect of hydraulic transients even if the load increases. This type of control makes adjustment easy.
- Braked stop: this type of stop is suitable for high inertia applications as it reduces the stopping time of the machine.