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**Soft start/soft stop units Altistart 48**

**Catalogues Altistart 48**

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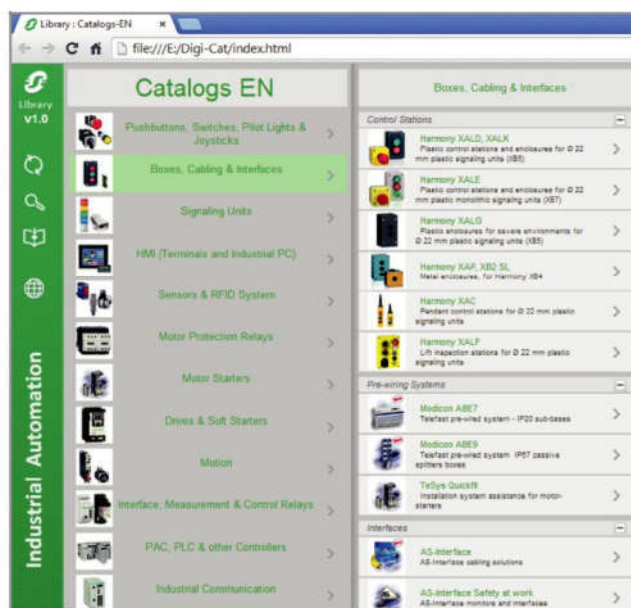
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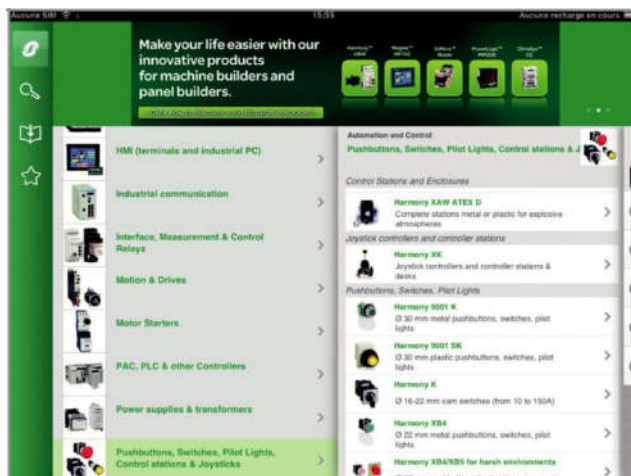
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# Soft starters for asynchronous motors

**Applications**

**Starting simple machines**

**Controlled starting and deceleration of simple machines**

**Controlled starting and deceleration of simple and complex machines**



**Power range for 50...60 Hz line supply (kW/HP)**  
(connection to the motor power supply line)

Single-phase 110...230 V (kW)
Three-phase 200...240 V (kW/HP)
Three-phase 200...480 V (kW/HP)
Three-phase 208...600 V (kW/HP)
Three-phase 208...690 V (kW/HP)
Three-phase 230...415 V (kW)
Three-phase 230...440 V (kW)
Three-phase 380...415 V (kW)
Three-phase 440...480 V (HP)

0.37...11/0.5...15	0.75...15/1...20
0..37...2..2	–
–	0..75...7..5/1...10
0..37...11/0.5...15	–
–	–
–	–
–	–
–	–
–	1..5...15
–	2...20

**Drive**

Number of controlled phases
Type of control
Operating cycle

1	2
–	–
–	–

**Functions**

**Bypass**

Number of I/Os	Analog inputs
	Logic inputs
	Analog outputs
	Logic outputs
	Relay outputs

Integrated
–
–
–
–
–

**Communication**

Integrated
Available as an option

–
–

**Standards and certifications**

IEC/EN 60947-4-2  
e, UL, CSA, C-Tick, and CCC

**References**

<b>ATS01N1pppp</b>	<b>ATS01N2pppp</b>
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**Pages**

Please refer to the Altistart 01 catalog..

4...400/3...500	3...630	3...900/3...1,200
–	–	–
–	–	–
–	–	–
4...400/3...500	–	–
–	–	3...900/3...1,200
–	3...630	–
4...355	–	–
–	–	–
–	–	–

**3**

Configurable voltage ramp	TCS (Torque Control System)
Standard	Standard and severe

Integrated	Available as an option
------------	------------------------

1 PTC probe	
3	4
–	1
–	2
2 (CO)	3

**Modbus**

–	Fipio, PROFIBUS DP, DeviceNet, Modbus TCP
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IEC/EN 60947-4-2, EMC class A e, UL, CSA, C-Tick, GOST, CCC	IEC/EN 60947-4-2, EMC class A and B e, UL, CSA, DNV, C-Tick, GOST, CCC, NOM, SEPRO, and TCF
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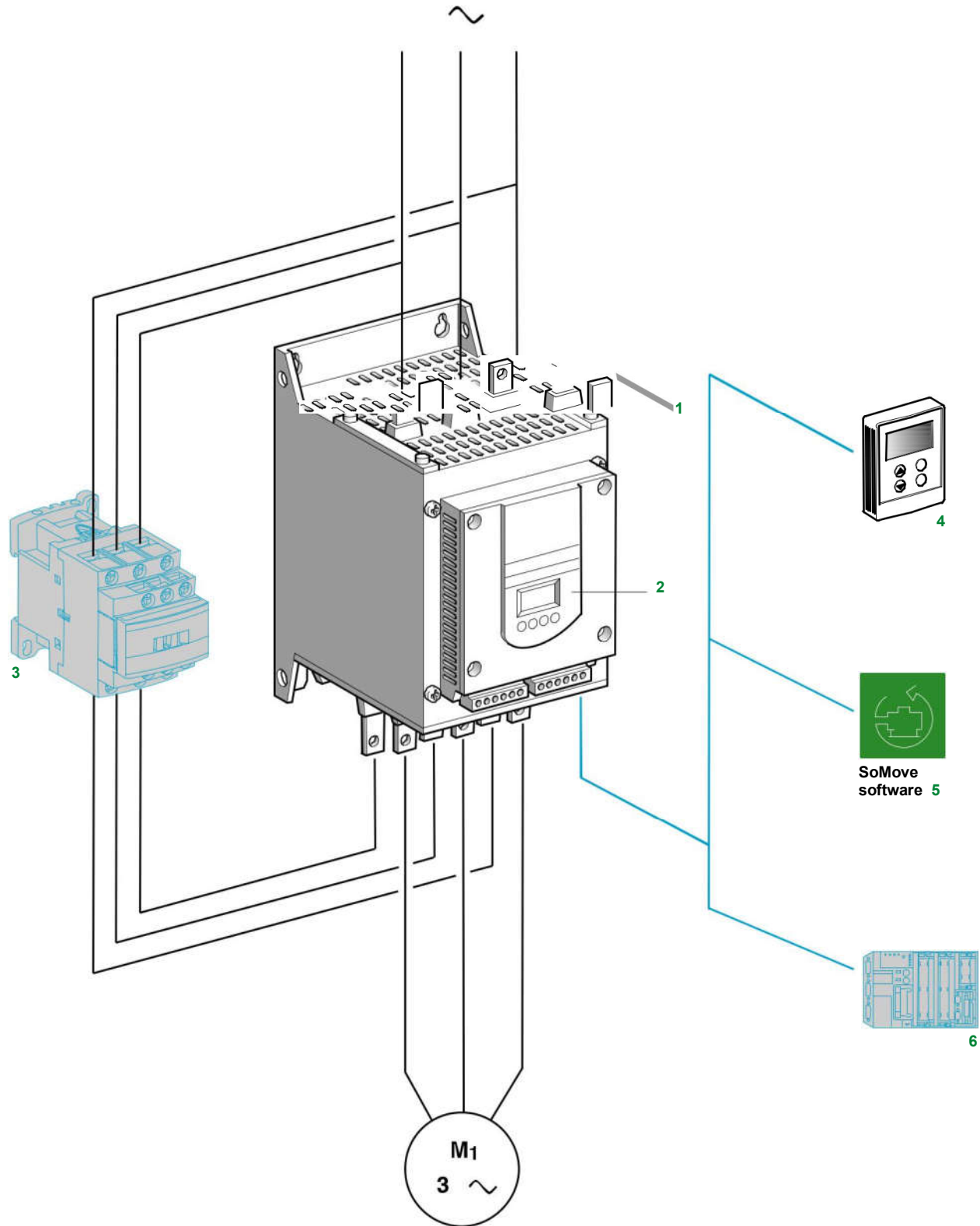
<b>ATS22pppp</b>	<b>ATS48pppQ</b>	<b>ATS48pppY</b>
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Please refer to the Altistart 22 catalog..

10	12
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# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units



# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Applications

The Altistart 48 soft start/soft stop unit is a controller with 6 thyristors used for torque-controlled soft starting and stopping of three-phase squirrel cage asynchronous motors, for power ratings between 4 and 900 kW..

It offers soft starting and deceleration functions along with machine and motor protection functions, as well as functions for communicating with control systems..

These functions are designed for use in the most common applications for centrifugal machines, pumps, fans, compressors and conveyors, which are primarily to be found in the construction, food and beverage and chemical industries. The high-performance algorithms of the Altistart 48 contribute significantly to its ruggedness, safety and ease of setup..

The Altistart 48 soft start/soft stop unit is a cost-effective solution which can:

bb reduce machine operating costs by reducing mechanical stress and improving machine availability,  
bb reduce the stress on the electrical distribution system by reducing line current peaks and voltage drops during motor starts..

bb The Altistart 48 soft start/soft stop unit offer comprises 2 ranges:

vv three-phase voltages 230 V to 415 V, 50/60 Hz,

vv three-phase voltages 208 V to 690 V, 50/60 Hz..

In each voltage range, the Altistart 48 soft start/soft stop units are sized for standard and severe applications..

### Functions

The Altistart 48 soft start/soft stop unit **1** is supplied ready for use in a standard application with class 10 motor protection..

It comprises an integrated display terminal **2**, which can be used to modify the programming, adjustment or monitoring functions in order to adapt and customize the application to meet individual customer requirements..

**bb Drive performance functions:**

vv exclusive Altistart torque control (patented by Schneider Electric),

vv constant control of the torque supplied to the motor during acceleration and deceleration periods (significantly reducing pressure surges),

vv ease of adjusting the ramp and the starting torque,

vv option of bypassing the starter using a contactor **3** at the end of the starting period whilst maintaining electronic protection (bypass function),

vv wide frequency tolerance for generator set power supplies,

vv option of connecting the starter to the motor delta terminals in series with each winding..

**bb Machine and motor protection functions:**

vv built-in motor thermal protection,

vv processing of information from PTC thermal probes,

vv monitoring of the starting time,

vv motor preheating function,

vv protection against underloads and overcurrents in steady state..

**bb Functions to ease integration into control systems:**

vv 4 logic inputs, 2 logic outputs, 3 relay outputs and 1 analog output,

vv plug-in I/O connectors,

vv function for configuring a second motor and easy-to-adapt settings,

vv display of electrical values, the state of the load and the operating

time, vv RS 485 serial link for connection to Modbus serial link..

### Advantage of starting with Altistart 48

bb Conventional electronic starting

To resolve problems such as:

-- mechanical stress on starting,

-- hydraulic transients on acceleration and deceleration in pumping applications, conventional electronic starting methods use a number of current limits, or switch several voltage ramps..

This makes adjustment complex and it has to be modified each time the load changes.

bb Starting with the Altistart 48

Altistart 48 torque control enables starting without mechanical stress and smooth control of hydraulic transitions, with a single acceleration ramp..

Making adjustments is quick and easy, whatever the load..

### Options

bb A remote terminal can be mounted on the door of a wall-fixing or floor-standing enclosure **4**..

bb SoMove setup software for PC **5**:

SoMove software incorporates various functions for the device setup phases:

vv configuration preparation,

vv commissioning,

vv maintenance..

For more detailed information, please consult our "SoMove - Setup software for motor control devices" specialist catalogue which can be downloaded from our website [www.schneider-electric.com](http://www.schneider-electric.com)..

bb A wiring accessories offer making it easy to connect the starter to PLCs on a Modbus serial link connection **6**..

bb Communication options for Ethernet, Fipio, DeviceNet and Profibus DP buses and networks.

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Selection criteria for an Altistart 48 soft start/soft stop unit

The Altistart 48 should be selected on the basis of 3 main criteria:

bb Two line supply voltage ranges are available for selection:

vv 3-phase AC supply: 230 – 415 V,

vv 3-phase AC supply: 208 – 690 V..

bb The power and nominal current on the motor rating plate..

bb The type of application and the operating cycle..

To simplify selection, applications are categorized as one of 2 types:

vv standard applications,

vv severe applications..

Standard or severe applications define the limit values of the current and the cycle for motor duties S1 and S4..

### Standard application

In standard applications, the Altistart 48 is designed to provide:

bb Starting at 4 In for 23 seconds or at 3 In for 46 seconds from cold state (corresponding to motor duty S1)..

bb Starting at 3 In for 23 seconds or at 4 In for 12 seconds with a load factor of 50% and 10 starts per hour or an equivalent thermal cycle (corresponding to motor duty S4)..

The motor thermal protection must conform to protection class 10..

Example: centrifugal pump..

### Severe application

In severe applications, the Altistart 48 is designed to provide:

bb Starting at 4 In for 48 seconds or at 3 In for 90 seconds from cold state (corresponding to motor duty S1)..

bb Starting at 4 In for 25 seconds with a load factor of 50% and 5 starts per hour or an equivalent thermal cycle (corresponding to motor duty S4)..

The motor thermal protection must conform to protection class 20..

Example: grinder..

### Motor duties

S1 motor duty is based on starting followed by operation at constant load, making it possible to achieve thermal equilibrium..

S4 motor duty is based on a cycle consisting of starting, operation at constant load and an idle period..

This cycle is characterized by a load factor of 50%..

### Selecting the starter

Once the appropriate application has been selected from the following page, select the starter from page 10 according to the supply voltage and the motor power..

### Caution:

If the Altistart 48 is installed inside an enclosure, observe the mounting and derating recommendations..

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Application areas

Depending on the type of machine, the applications are categorized as standard or severe based on the starting characteristics, which are given as examples only, in the table below..

Type of machine	Application	Functions performed by the Altistart 48	Starting current (% I <sub>n</sub> )	Starting time (s)
Centrifugal pump	Standard	Deceleration (reduction in pressure surges) Protection against underload or reversal of phase rotation direction	300	5 to 15
Piston pump	Standard	Control of pump priming and the pump's direction of rotation	350	5 to 10
Fan	Standard Severe if > 30 s	Detection of overloads caused by clogging or underloads (motor/fan transmission broken) Braking torque on stopping	300	10 to 40
Cold compressor	Standard	Protection, even for special motors	300	5 to 10
Screw compressor	Standard	Protection against reversal of phase rotation direction Contact for automatic draining on stopping	300	3 to 20
Centrifugal compressor	Standard Severe if > 30 s	Protection against reversal of phase rotation direction Contact for automatic draining on stopping	350	10 to 40
Piston compressor	Standard	Protection against reversal of phase rotation direction Contact for automatic draining on stopping	350	5 to 10
Conveyor, transporter	Standard	Monitoring of overloads for incident detection or underloads for break detection	300	3 to 10
Lifting screw	Standard	Monitoring of overloads for hard spot detection or underloads for break detection	300	3 to 10
Drag lift	Standard	Monitoring of overloads for jamming detection or underloads for break detection	400	2 to 10
Elevator	Standard	Monitoring of overloads for jamming detection or underloads for break detection Constant starting with variable load	350	5 to 10
Circular saw, band saw	Standard Severe if > 30 s	Braking for fast stop	300	10 to 60
Pulper, butchery knife	Severe	Torque control on starting	400	3 to 10
Agitator	Standard	The current display indicates the density of the material	350	5 to 20
Mixer	Standard	The current display indicates the density of the material	350	5 to 10
Grinder	Severe	Braking to limit vibrations during stopping, monitoring of overloads for jamming detection	450	5 to 60
Crusher	Severe	Braking to limit vibrations during stopping, monitoring of overloads for jamming detection	400	10 to 40
Refiner	Standard	Torque control on starting and stopping	300	5 to 30
Press	Severe	Braking to increase the number of cycles	400	20 to 60



# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Special uses

Other criteria can influence selection of the Altistart 48 rating:

#### Starter wired to the motor delta terminals

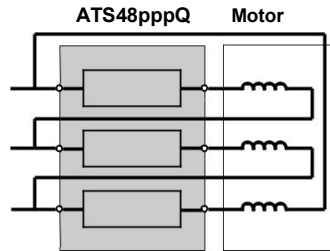
In addition to the most frequently encountered wiring layouts, where the starter is installed in the line supply of the motor and the motor is connected in star or delta configuration, the Altistart 48 ATS48pppQ can be wired to the motor delta terminals in series with each winding (see figure below). The starter current is lower by a ratio of 3 than the line current absorbed by the motor.. This type of installation enables a starter with a lower rating to be used..

Example: For a 400 V/110 kW motor with a line current of 195 A (current indicated on the rating plate for the delta connection), the current in each winding is equal to  $195/3$  i.e.. 114 A..

Select the starter rating with a maximum permanent nominal current just above this current, i.e.. 140 A (ATS48C14Q for a standard application)..

To avoid the need to do this calculation, simply use the table on page 11..

This type of installation only permits freewheel stopping and is not compatible with the cascade and preheating functions..



Starter wired in series with the motor windings

**Note:** The nominal current and limiting current settings as well as the current displayed during operation are on-line values (so do not have to be calculated by the user)..

**Caution:** For this type of installation, observe the wiring scheme and the associated recommendations..

#### Starter bypassed by a contactor

The starter can be bypassed by a contactor at the end of starting (to limit the heat dissipated by the starter).. The bypass contactor is controlled by the starter, and the current measurements and protective mechanisms remain active when the starter is bypassed..

The starter is selected on the basis of the 3 main criteria and one of the following criteria:

bb If the starter is bypassed at the end of starting, the motor is always started from cold state and the starter can be oversized by one rating..

Example: Select an ATS 48D17Q for an 11 kW motor in a standard 400 V application..

bb If the starter needs to be able to operate without the bypass contactor at the end of starting, it does not have to be derated..

Example: Select an ATS 48D17Q for a 7..5 kW motor in a standard 400 V application..

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Special uses (continued)

#### Motors in parallel

Motors may be connected in parallel provided that the power limit of the starter is not exceeded (the sum of the motor currents must be less than the nominal current of the starter chosen according to the type of application).. Provide thermal protection for each motor..

#### Slip-ring motors

The Altistart 48 can operate with a bypassed rotor resistance motor or with a threshold resistor. The starting torque is modified according to the rotor resistance. If necessary, keep a low-value resistor in order to obtain the required torque to overcome the resistive torque on starting..

A bypassed slip-ring motor has very low starting torque.. A high stator current is required to obtain sufficient starting torque.

Oversize the starter in order to have a limiting current 7 times that of the nominal current..

**Note:** Ensure that the motor starting torque, equal to 7 times the nominal current, is greater than the resistive torque.

**Comment:** The Altistart 48 torque control enables excellent soft starting despite the limiting current being 7 times the nominal current required to start the motor..

#### Dahlander motor and 2-speed motor

The Altistart 48 can operate with a 2-speed motor.. A motor demagnetization period must elapse before changing from low speed to high speed in order to avoid antiphases between the line supply and the motor, which would generate very high currents..

Select the starter using the 3 main criteria..

#### Very long cable

Very long motor cables cause voltage drops due to the resistance of the cable.. If the voltage drop is significant, it could affect the current consumption and the torque available.. This must therefore be taken into account when selecting the motor and the starter..

#### Starters in parallel on the same line supply

If several starters are installed on the same line supply, line chokes should be installed between the transformer and the starter (see page 27)..

#### Recommendations for use

**Caution:** Do not use the Altistart 48 upstream of loads other than motors (for example, transformers and resistors are forbidden)..

Do not connect power factor correction capacitors to the terminals of a motor controlled by an Altistart 48..

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

Line voltage 230....415 V

Connection in the motor supply line



ATS48D17Q



ATS48C14Q



ATS48M12Q

## For standard applications

Motor		Starter 230...415 V - 50/60 Hz				
Motor power (1)		Nominal current (IcL) (2)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
230 V	400 V					
kW	kW	A	A	W		kg/lb
4	7.5	17	14.8	59	ATS48D17Q	4..900/10.803
5.5	11	22	21	74	ATS48D22Q	4..900/10.803
7.5	15	32	28.5	104	ATS48D32Q	4..900/10.803
9	18..5	38	35	116	ATS48D38Q	4..900/10.803
11	22	47	42	142	ATS48D47Q	4..900/10.803
15	30	62	57	201	ATS48D62Q	8..300/18.298
18..5	37	75	69	245	ATS48D75Q	8..300/18.298
22	45	88	81	290	ATS48D88Q	8..300/18.298
30	55	110	100	322	ATS48C11Q	8..300/18.298
37	75	140	131	391	ATS48C14Q	12..400/27.337
45	90	170	162	479	ATS48C17Q	12..400/27.337
55	110	210	195	580	ATS48C21Q	18..200/40.124
75	132	250	233	695	ATS48C25Q	18..200/40.124
90	160	320	285	902	ATS48C32Q	18..200/40.124
110	220	410	388	1339	ATS48C41Q	51..400/113.317
132	250	480	437	1386	ATS48C48Q	51..400/113.317
160	315	590	560	1731	ATS48C59Q	51..400/113.317
-	355	660	605	1958	ATS48C66Q	51..400/113.317
220	400	790	675	2537	ATS48C79Q	115..000/253.531
250	500	1000	855	2865	ATS48M10Q	115..000/253.531
355	630	1200	1045	3497	ATS48M12Q	115..000/253.531

## For severe applications

Motor		Starter 230...415 V - 50/60 Hz				
Motor power (1)		Nominal current (3)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
230 V	400 V					
kW	kW	A	A	W		kg/lb
3	5.5	12	14.8	46	ATS48D17Q	4..900/10.803
4	7.5	17	21	59	ATS48D22Q	4..900/10.803
5.5	11	22	28.5	74	ATS48D32Q	4..900/10.803
7..5	15	32	35	99	ATS48D38Q	4..900/10.803
9	18..5	38	42	116	ATS48D47Q	4..900/10.803
11	22	47	57	153	ATS48D62Q	8..300/18.298
15	30	62	69	201	ATS48D75Q	8..300/18.298
18..5	37	75	81	245	ATS48D88Q	8..300/18.298
22	45	88	100	252	ATS48C11Q	8..300/18.298
30	55	110	131	306	ATS48C14Q	12..400/27.337
37	75	140	162	391	ATS48C17Q	12..400/27.337
45	90	170	195	468	ATS48C21Q	18..200/40.124
55	110	210	233	580	ATS48C25Q	18..200/40.124
75	132	250	285	695	ATS48C32Q	18..200/40.124
90	160	320	388	1017	ATS48C41Q	51..400/113.317
110	220	410	437	1172	ATS48C48Q	51..400/113.317
132	250	480	560	1386	ATS48C59Q	51..400/113.317
160	315	590	605	1731	ATS48C66Q	51..400/113.317
-	355	660	675	2073	ATS48C79Q	115..000/253.531
220	400	790	855	2225	ATS48M10Q	115..000/253.531
250	500	1000	1045	2865	ATS48M12Q	115..000/253.531

(1) Value indicated on the motor rating plate.

(2) Corresponds to the maximum continuous current in class 10. I<sub>cL</sub> corresponds to the starter rating.

(3) Corresponds to the maximum continuous current in class 20.

(4) The factory setting current corresponds to the nominal current of a standard 4-pole, 400 V, class 10 motor (standard application). Adjust it in line with the current indicated on the motor rating plate.

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Line voltage 230... 415 V

### Connection to the motor delta terminals

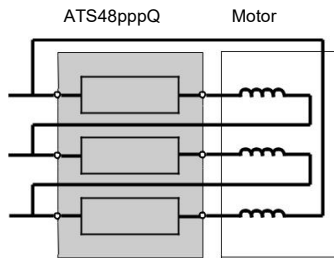


Figure 1  
Special use:  
starter connected to the motor delta  
terminals, in series with each winding.

#### For standard applications according to figure 1

Motor		Starter 230...415 V - 50/60 Hz				
Motor power (1)		Nominal current (2)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
230 V	400 V	A	A	W		kg/lb
kW	kW					
7.5	15	29	14..8	59	ATS48D17Q	4..900/10.803
9	18..5	38	21	74	ATS48D22Q	4..900/10.803
15	22	55	28..5	104	ATS48D32Q	4..900/10.803
18..5	30	66	35	116	ATS48D38Q	4..900/10.803
22	45	81	42	142	ATS48D47Q	4..900/10.803
30	55	107	57	201	ATS48D62Q	8..300/18.298
37	55	130	69	245	ATS48D75Q	8..300/18.298
45	75	152	81	290	ATS48D88Q	8..300/18.298
55	90	191	100	322	ATS48C11Q	8..300/18.298
75	110	242	131	391	ATS48C14Q	12..400/27.337
90	132	294	162	479	ATS48C17Q	12..400/27.337
110	160	364	195	580	ATS48C21Q	18..200/40.124
132	220	433	233	695	ATS48C25Q	18..200/40.124
160	250	554	285	902	ATS48C32Q	18..200/40.124
220	315	710	388	1339	ATS48C41Q	51..400/113.317
250	355	831	437	1386	ATS48C48Q	51..400/113.317
-	400	1022	560	1731	ATS48C59Q	51..400/113.317
315	500	1143	605	1958	ATS48C66Q	51..400/113.317
355	630	1368	675	2537	ATS48C79Q	115..000/253.531
-	710	1732	855	2865	ATS48M10Q	115..000/253.531
500	-	2078	1045	3497	ATS48M12Q	115..000/253.531

#### For severe applications according to figure 1

Motor		Starter 230...415 V - 50/60 Hz				
Motor power (1)		Nominal current (3)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
230 V	400 V	A	A	W		kg/lb
kW	kW					
5..5	11	22	14..8	46	ATS48D17Q	4..900/10.803
7..5	15	29	21	59	ATS48D22Q	4..900/10.803
9	18..5	38	28..5	74	ATS48D32Q	4..900/10.803
15	22	55	35	99	ATS48D38Q	4..900/10.803
18..5	30	66	42	116	ATS48D47Q	4..900/10.803
22	45	81	57	153	ATS48D62Q	8..300/18.298
30	55	107	69	201	ATS48D75Q	8..300/18.298
37	55	130	81	245	ATS48D88Q	8..300/18.298
45	75	152	100	252	ATS48C11Q	8..300/18.298
55	90	191	131	306	ATS48C14Q	12..400/27.337
75	110	242	162	391	ATS48C17Q	12..400/27.337
90	132	294	195	468	ATS48C21Q	18..200/40.124
110	160	364	233	580	ATS48C25Q	18..200/40.124
132	220	433	285	695	ATS48C32Q	18..200/40.124
160	250	554	388	1017	ATS48C41Q	51..400/113.317
220	315	710	437	1172	ATS48C48Q	51..400/113.317
250	355	831	560	1386	ATS48C59Q	51..400/113.317
-	400	1022	605	1731	ATS48C66Q	51..400/113.317
315	500	1143	675	2073	ATS48C79Q	115..000/253.531
355	630	1368	855	2225	ATS48M10Q	115..000/253.531
-	710	1732	1045	2865	ATS48M12Q	115..000/253.531

(1) Value indicated on the motor rating plate.

(2) Corresponds to the maximum continuous current in class 10.

(3) Corresponds to the maximum continuous current in class 20.

(4) For this type of connection, the factory setting current must be adjusted in line with the current indicated on the motor rating plate.

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

Line voltage 208....690 V

Motor power given in HP



ATS48D17Y



ATS48C14Y



ATS48M12Y

## For standard applications

Motor					Starter 208...690 V - 50/60 Hz				
Motor power (1)					Nominal current (IcL) (2)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
208 V	230 V	460 V	575 V	A					
HP	HP	HP	HP						
3	5	10	15	17	14	59	ATS48D17Y	4..900/10.803	
5	7.5	15	20	22	21	74	ATS48D22Y	4..900/10.803	
7.5	10	20	25	32	27	104	ATS48D32Y	4..900/10.803	
10	–	25	30	38	34	116	ATS48D38Y	4..900/10.803	
–	15	30	40	47	40	142	ATS48D47Y	4..900/10.803	
15	20	40	50	62	52	201	ATS48D62Y	8..300/18.298	
20	25	50	60	75	65	245	ATS48D75Y	8..300/18.298	
25	30	60	75	88	77	290	ATS48D88Y	8..300/18.298	
30	40	75	100	110	96	322	ATS48C11Y	8..300/18.298	
40	50	100	125	140	124	391	ATS48C14Y	12..400/27.337	
50	60	125	150	170	156	479	ATS48C17Y	12..400/27.337	
60	75	150	200	210	180	580	ATS48C21Y	18..200/40.124	
75	100	200	250	250	240	695	ATS48C25Y	18..200/40.124	
100	125	250	300	320	302	902	ATS48C32Y	18..200/40.124	
125	150	300	350	410	361	1339	ATS48C41Y	51..400/113.317	
150	–	350	400	480	414	1386	ATS48C48Y	51..400/113.317	
–	200	400	500	590	477	1731	ATS48C59Y	51..400/113.317	
200	250	500	600	660	590	1958	ATS48C66Y	51..400/113.317	
250	300	600	800	790	720	2537	ATS48C79Y	115..000/253.531	
350	350	800	1000	1000	954	2865	ATS48M10Y	115..000/253.531	
400	450	1000	1200	1200	1170	3497	ATS48M12Y	115..000/253.531	

## For severe applications

Motor					Starter 208...690 V - 50/60 Hz				
Motor power (1)					Nominal current (3)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
208 V	230 V	460 V	575 V	A					
HP	HP	HP	HP						
2	3	7.5	10	12	14	46	ATS48D17Y	4..900/10.803	
3	5	10	15	17	21	59	ATS48D22Y	4..900/10.803	
5	7.5	15	20	22	27	74	ATS48D32Y	4..900/10.803	
7.5	10	20	25	32	34	99	ATS48D38Y	4..900/10.803	
10	–	25	30	38	40	116	ATS48D47Y	4..900/10.803	
–	15	30	40	47	52	153	ATS48D62Y	8..300/18.298	
15	20	40	50	62	65	201	ATS48D75Y	8..300/18.298	
20	25	50	60	75	77	245	ATS48D88Y	8..300/18.298	
25	30	60	75	88	96	252	ATS48C11Y	8..300/18.298	
30	40	75	100	110	124	306	ATS48C14Y	12..400/27.337	
40	50	100	125	140	156	391	ATS48C17Y	12..400/27.337	
50	60	125	150	170	180	468	ATS48C21Y	18..200/40.124	
60	75	150	200	210	240	580	ATS48C25Y	18..200/40.124	
75	100	200	250	250	302	695	ATS48C32Y	18..200/40.124	
100	125	250	300	320	361	1017	ATS48C41Y	51..400/113.317	
125	150	300	350	410	414	1172	ATS48C48Y	51..400/113.317	
150	–	350	400	480	477	1386	ATS48C59Y	51..400/113.317	
–	200	400	500	590	590	1731	ATS48C66Y	51..400/113.317	
200	250	500	600	660	720	2073	ATS48C79Y	115..000/253.531	
250	300	600	800	790	954	2225	ATS48M10Y	115..000/253.531	
350	350	800	1000	1000	1170	2865	ATS48M12Y	115..000/253.531	

(1) Value indicated on the motor rating plate.

(2) Corresponds to the maximum continuous current in class 10. IcL corresponds to the starter rating.

(3) Corresponds to the maximum continuous current in class 20.

(4) The factory setting current corresponds to the nominal current of a standard NEC, 460 V, class 10 motor (standard application). Adjust it in line with the current indicated on the motor rating plate.

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

Line voltage 208.... 690 V

Motor power in kW

For standard applications								Starter 208...690 V - 50/60 Hz				
Motor								Nominal current (IcL) (2)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
Motor power (1)												
230 V	400 V	440 V	500 V	525 V	660 V	690 V		A	A	W		kg/lb
kW	kW	kW	kW	kW	kW	kW						
4	7..5	7..5	9	9	11	15		17	14	59	ATS48D17Y	4..900/10.803
5.5	11	11	11	11	15	18..5		22	21	74	ATS48D22Y	4..900/10.803
7.5	15	15	18..5	18..5	22	22		32	27	104	ATS48D32Y	4..900/10.803
9	18..5	18..5	22	22	30	30		38	34	116	ATS48D38Y	4..900/10.803
11	22	22	30	30	37	37		47	40	142	ATS48D47Y	4..900/10.803
15	30	30	37	37	45	45		62	52	201	ATS48D62Y	8..300/18.298
18..5	37	37	45	45	55	55		75	65	245	ATS48D75Y	8..300/18.298
22	45	45	55	55	75	75		88	77	290	ATS48D88Y	8..300/18.298
30	55	55	75	75	90	90		110	96	322	ATS48C11Y	8..300/18.298
37	75	75	90	90	110	110		140	124	391	ATS48C14Y	12..400/27.337
45	90	90	110	110	132	160		170	156	479	ATS48C17Y	12..400/27.337
55	110	110	132	132	160	200		210	180	580	ATS48C21Y	18..200/40.124
75	132	132	160	160	220	250		250	240	695	ATS48C25Y	18..200/40.124
90	160	160	220	220	250	315		320	302	902	ATS48C32Y	18..200/40.124
110	220	220	250	250	355	400		410	361	1339	ATS48C41Y	51..400/113.317
132	250	250	315	315	400	500		480	414	1386	ATS48C48Y	51..400/113.317
160	315	355	400	400	560	560		590	477	1731	ATS48C59Y	51..400/113.317
–	355	400	–	–	630	630		660	590	1958	ATS48C66Y	51..400/113.317
220	400	500	500	500	710	710		790	720	2537	ATS48C79Y	115..000/253.531
250	500	630	630	630	900	900		1000	954	2865	ATS48M10Y	115..000/253.531
355	630	710	800	800	–	–		1200	1170	3497	ATS48M12Y	115..000/253.531

For severe applications								Starter 208...690 V - 50/60 Hz				
Motor								Nominal current (3)	Factory setting current (4)	Dissipated power at nominal load	Reference	Weight
Motor power (1)												
230 V	400 V	440 V	500 V	525 V	660 V	690 V		A	A	W		kg/lb
kW	kW	kW	kW	kW	kW	kW						
3	5..5	5..5	7..5	7..5	9	11		12	14	46	ATS48D17Y	4..900/10.803
4	7..5	7..5	9	9	11	15		17	21	59	ATS48D22Y	4..900/10.803
5.5	11	11	11	11	15	18..5		22	27	74	ATS48D32Y	4..900/10.803
7.5	15	15	18..5	18..5	22	22		32	34	99	ATS48D38Y	4..900/10.803
9	18..5	18..5	22	22	30	30		38	40	116	ATS48D47Y	4..900/10.803
11	22	22	30	30	37	37		47	52	153	ATS48D62Y	8..300/18.298
15	30	30	37	37	45	45		62	65	201	ATS48D75Y	8..300/18.298
18..5	37	37	45	45	55	55		75	77	245	ATS48D88Y	8..300/18.298
22	45	45	55	55	75	75		88	96	252	ATS48C11Y	8..300/18.298
30	55	55	75	75	90	90		110	124	306	ATS48C14Y	12..400/27.337
37	75	75	90	90	110	110		140	156	391	ATS48C17Y	12..400/27.337
45	90	90	110	110	132	160		170	180	468	ATS48C21Y	18..200/40.124
55	110	110	132	132	160	200		210	240	580	ATS48C25Y	18..200/40.124
75	132	132	160	160	220	250		250	302	695	ATS48C32Y	18..200/40.124
90	160	160	220	220	250	315		320	361	1017	ATS48C41Y	51..400/113.317
110	220	220	250	250	355	400		410	414	1172	ATS48C48Y	51..400/113.317
132	250	250	315	315	400	500		480	477	1386	ATS48C59Y	51..400/113.317
160	315	355	400	400	560	560		590	590	1731	ATS48C66Y	51..400/113.317
–	355	400	–	–	630	630		660	720	2073	ATS48C79Y	115..000/253.531
220	400	500	500	500	710	710		790	954	2225	ATS48M10Y	115..000/253.531
250	500	630	630	630	900	900		1000	1170	2865	ATS48M12Y	115..000/253.531

(1) Value indicated on the motor rating plate.

(2) Corresponds to the maximum continuous current in class 10. IcL corresponds to the starter rating.

(3) Corresponds to the maximum continuous current in class 20.

(4) The factory setting current corresponds to the nominal current of a standard NEC, 460 V, class 10 motor (standard application). Adjust it in line with the current indicated on the motor rating plate.

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

230 V power supply

Type 1 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2

Use either a circuit-breaker (light green columns), contactor, starter combination or a switch/fuse (dark green columns), contactor, starter combination

Motor	Starter (1)		Circuit-breaker		Type of contactor	Type of switch or switch disconnector (bare unit)	aM fuses				
	Class 10	Class 20	Reference	Rating			Unit reference (3)		Size	Rating	
							Without striker	With striker			
kW	A	Standard applications	Severe applications		A				A		
M1	A1			Q1		KM1, KM2, KM3					
3	11.5	-	ATS48D17p	GV2L20	18	LC1D18	LS1D32	DF2CA16	-	10 x 38	-
				NS80HMA	12..5	LC1D18	LS1D32	DF2CA16	-	10 x 38	16
4	14..5	ATS48D17p	ATS48D22p	GV2L20	18	LC1D18	LS1D32	DF2CA16	-	10 x 38	16
				NS80HMA	25	LC1D18	LS1D32	DF2CA16	-	10 x 38	16
5.5	20	ATS48D22p	ATS48D32p	GV2L22	25	LC1D25	LS1D32	DF2CA25	-	10 x 38	25
				NS80HMA	25	LC1D25	LS1D32	DF2CA25	-	10 x 38	25
7.5	27	ATS48D32p	ATS48D38p	GV2L32	32	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51	32
				NS80HMA	50	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51	32
9	32	ATS48D38p	ATS48D47p	GV3L40	40	LC1D38	GK1EK	DF2EA40	DF3EA40	14 x 51	40
				NS80HMA	50	LC1D38	GK1EK	DF2EA40	DF3EA40	14 x 51	40
11	39	ATS48D47p	ATS48D62p	GV3L65	65	LC1D50A	GS1K	DF2FA50	DF3FA50	22 x 58	50
				NS80HMA	50	LC1D50A	GS1K	DF2FA50	DF3FA50	22 x 58	50
15	52	ATS48D62p	ATS48D75p	GV3L65	65	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58	80
				NS80HMA	80	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58	80
18..5	64	ATS48D75p	ATS48D88p	NS80HMA	80	LC1D80	GS1K	DF2FA80	DF3FA80	22 x 58	80
22	75	ATS48D88p	ATS48C11p	NSX100pMA (2)	100	LC1D115	GS1K	DF2FA100	DF3FA100	22 x 58	100
30	103	ATS48C11p	ATS48C14p	NSX160pMA (2)	150	LC1D115	GS1K	DF2FA125	DF4FA125	22 x 58	125
37	126	ATS48C14p	ATS48C17p	NSX160pMA (2)	150	LC1D150	GS1L	DF2GA1161	DF4GA1161	0	160
45	150	ATS48C17p	ATS48C21p	NSX250pMA (2)	220	LC1F185	GS1N	DF2HA1201	DF4HA1201	1	200
55	182	ATS48C21p	ATS48C25p	NSX250pMA (2)	220	LC1F225	GS1N	DF2HA1201	DF4HA1201	1	200
75	240	ATS48C25p	ATS48C32p	NSX400p (2)	320	LC1F265	GS1QQ	DF2JA1251	DF4JA1251	2	250
				Micrologic 1.3M							
90	295	ATS48C32p	ATS48C41p	NSX400p (2)	320	LC1F330	GS1QQ	DF2JA1311	DF4JA1311	2	315
				Micrologic 1.3M							
110	356	ATS48C41p	ATS48C48p	NSX630p (2)	500	LC1F400	GS1S	DF2KA1401	DF4KA1401	3	400
				Micrologic 1.3M							
132	425	ATS48C48p	ATS48C59p	NSX630p (2)	500	LC1F500	GS1S	DF2KA1501	DF4KA1501	3	500
				Micrologic 1.3M							
160	520	ATS48C59p	ATS48C66p	NS630bp (2)	630	LC1F630	GS1S	DF2KA1631	DF4KA1631	3	630
				Micrologic 5.0 LR Off							
200	630	ATS48C66p	ATS48C79p	NS800p (2)	800	LC1F800	GS1S	DF2KA1631	DF4KA1631	3	630
				Micrologic 5.0 LR Off							
220	700	ATS48C79p	ATS48M10p	NS800p (2)	800	LC1F800	GS1V	DF2LA1801	DF4LA1801	4	800
				Micrologic 5.0 LR Off							
250	800	ATS48M10p	ATS48M12p	NS1000p (2)	1000	LC1BM33	GS1V	DF2LA1101	DF4LA1101	4	1000
				Micrologic 5.0 LR Off							
355	1115	ATS48M12p	-	NS1250p (2)	1250	LC1BP33	-	DF2LA1251	DF4LA1251	4	1250
				Micrologic 5.0 LR Off							

(1) Replace p with Q or Y according to the starter's voltage range.

(2) Replace p with F, N, H, S, L or LB according to the breaking capacity (see the breaking capacity table below).

(3) DF2CA, DFpEA, DFpFA: sold in lots of 20.

DFpGA, DFpKA: sold in lots of 3.

DFpLA: sold singly.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Breaking capacity of circuit-breakers according to standard IEC 60947-4-2							
Starter	Iq (kA)	230 V		Icu (kA)					
ATS48D17p to ATS48C32p	50	GV2L20		100					
ATS48C41p to ATS48M12p	70	GV2L22, GV2L32, GV3L40, GV3L65		50					
		230 V		Icu (kA)					
				F	N	H	S	L	LB
		NS80HMA		-	-	100 kA	-	-	-
		NSX100/160/250		85 kA	90 kA	100 kA	120 kA	150 kA	-
		NSX400/630		85 kA	90 kA	100 kA	120 kA	150 kA	-
		NS630b/800L/LB		-	-	-	-	150 kA	200 kA
		NS1000L		-	-	-	-	150 kA	-
		NS1250		-	50 kA	70 kA	-	-	-

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units  
230 V power supply  
Type 2 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2: circuit-breakers, contactors, fast-acting fuses, starters

Combination: circuit-breaker, contactor, starter

Motor		Starter (1)		Circuit-breaker		Type of contactor
kW	A	Class 10	Class 20	Reference	Rating A	
		Standard applications	Severe applications			
M1		A1		Q1		KM1, KM2, KM3
3	11.5	–	ATS48D17p	GV2L20 NS80HMA	18 12..5	LC1D40A LC1D40
4	14.5	ATS48D17p	ATS48D22p	GV2L20 NS80HMA	18 25	LC1D40A LC1D40
5..5	20	ATS48D22p	ATS48D32p	GV2L22 NS80HMA	25 25	LC1D40A LC1D40
7..5	27	ATS48D32p	ATS48D38p	GV2L32 NS80HMA	32 50	LC1D40A LC1D80
9	32	ATS48D38p	ATS48D47p	GV3L40 NS80HMA	40 50	LC1D80 LC1D80
11	39	ATS48D47p	ATS48D62p	GV3L65 NS80HMA	65 50	LC1D80 LC1D80
15	52	ATS48D62p	ATS48D75p	NS80HMA	80	LC1D80
18..5	64	ATS48D75p	ATS48D88p	NS80HMA	80	LC1D80
22	75	ATS48D88p	ATS48C11p	NSX100pMA (2)	100	LC1D115
30	103	ATS48C11p	ATS48C14p	NSX160pMA (2)	150	LC1D115
37	126	ATS48C14p	ATS48C17p	NSX160pMA (2)	150	LC1D150
45	150	ATS48C17p	ATS48C21p	NSX250pMA (2)	220	LC1F185
55	182	ATS48C21p	ATS48C25p	NSX250pMA (2)	220	LC1F225
75	240	ATS48C25p	ATS48C32p	NSX400p (2) Micrologic 1.3M	320	LC1F265
90	295	ATS48C32p	ATS48C41p	NSX400p (2) Micrologic 1.3M	320	LC1F330
110	356	ATS48C41p	ATS48C48p	NSX630p (2) Micrologic 1.3M	500	LC1F400
132	425	ATS48C48p	ATS48C59p	NSX630p (2) Micrologic 1.3M	500	LC1F500
160	520	ATS48C59p	ATS48C66p	NS630bL/LB Micrologic 5.0 LR Off	630	LC1F630
200	626	ATS48C66p	ATS48C79p	NS800L/LB Micrologic 5.0 LR Off	800	LC1F800
220	700	ATS48C79p	ATS48M10p	NS800L/LB Micrologic 5.0 LR Off	800	LC1F800
250	800	ATS48M10p	ATS48M12p	NS1000L Micrologic 5.0 LR Off	1000	LC1BM33
355	1115	ATS48M12p	–	NS1250p (3) Micrologic 5.0 LR Off	1250	LC1BP33

- (1) Replace p with Q or Y according to the starter's voltage range.  
 (2) Replace p with F, N, H, S, L or LB according to the breaking capacity (see the breaking capacity table on page 14).  
 (3) Type 2 coordination is only possible if the fast-acting fuses remain in the motor supply circuit and are not bypassed at the end of starting.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Fast-acting fuse (essential for type 2 coordination) and starter combinations				
Starter	Iq (kA)	Starter Reference	Fast-acting fuses with microswitch			
			Unit reference (4)	Size	Rating A	I <sub>ct</sub> kA <sub>2.s</sub>
ATS48D17p to ATS48C79p	50	A1	Q3			
ATS48M10p and ATS48M12p	85					
		ATS48D17p	DF3ER50	14 x 51	50	2..3
		ATS48D22p and ATS48D32p	DF3FR80	22 x 58	80	5..6
		ATS48D38p and ATS48D47p	DF3FR100	22 x 58	100	12
		ATS48D62p and ATS48D75p	DF400125	00	125	45
		ATS48D88p and ATS48C11p	DF400160	00	160	82
		ATS48C14p and ATS48C17p	DF430400	30	400	120
		ATS48C21p to ATS48C32p	DF431700	31	700	490
		ATS48D75p	DF433800	33	800	490
		ATS48C48p and ATS48C59p	DF4331000	33	1000	900
		ATS48C66p	DF42331400	2 x 33	1400	1200
		ATS48C79p	DF4441600	44	1600	1600
		ATS48M10p and ATS48M12p	DF4442200	44	2200	4100

- (4) DF3ER, DF3FR: sold in lots of 10.  
 DF4: sold singly.



# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

380 V, 400 V, 415 V power supply

Type 1 coordination

Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2										
Use either a circuit-breaker (light green columns), contactor, starter combination or a switch/fuse (dark green columns), contactor, starter combination										
Motor	Starter (1)		Circuit-breaker		Type of contactor	Type of switch or switch disconnector (bare unit)	aM fuses			
	Class 10 Standard applications	Class 20 Severe applications	Reference	Rating			Unit reference (3)		Size	Rating
kW	A				A		Without striker	With striker		A
M1	A1		Q1		KM1, KM2, KM3					
5.5	11	-	ATS48D17p	GV2L20	18	LC1D18	LS1D32	DF2CA16	-	10 x 38 16
				NS80HMA	12.5	LC1D18	LS1D32	DF2CA16	-	10 x 38 16
7.5	14..8	ATS48D17p	ATS48D22p	GV2L20	18	LC1D18	LS1D32	DF2CA16	-	10 x 38 16
				NS80HMA	25	LC1D18	LS1D32	DF2CA16	-	10 x 38 16
11	21	ATS48D22p	ATS48D32p	GV2L22	25	LC1D25	LS1D32	DF2CA25	-	10 x 38 25
				NS80HMA	25	LC1D25	LS1D32	DF2CA25	-	10 x 38 25
15	28..5	ATS48D32p	ATS48D38p	GV2L32	32	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51 32
				NS80HMA	50	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51 32
18..5	35	ATS48D38p	ATS48D47p	GV3L40	40	LC1D38	GK1EK	DF2EA40	DF3EA40	14 x 51 40
				NS80HMA	50	LC1D38	GK1EK	DF2EA40	DF3EA40	14 x 51 40
22	42	ATS48D47p	ATS48D62p	GV3L65	65	LC1D50A	GS1K	DF2FA50	DF3FA50	22 x 58 50
				NS80HMA	50	LC1D50A	GS1K	DF2FA50	DF3FA50	22 x 58 50
30	57	ATS48D62p	ATS48D75p	GV3L65	65	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58 80
				NS80HMA	80	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58 80
37	69	ATS48D75p	ATS48D88p	NS80HMA	80	LC1D80	GS1K	DF2FA80	DF3FA80	22 x 58 80
45	81	ATS48D88p	ATS48C11p	NSX100pMA (2)	100	LC1D115	GS1K	DF2FA100	DF3FA100	22 x 58 100
55	100	ATS48C11p	ATS48C14p	NSX160pMA (2)	150	LC1D115	GS1K	DF2FA125	DF4FA125	22 x 58 125
75	131	ATS48C14p	ATS48C17p	NSX160pMA (2)	150	LC1D150	GS1L	DF2GA1161	DF4GA1161	0 160
90	162	ATS48C17p	ATS48C21p	NSX250pMA (2)	220	LC1F185	GS1N	DF2HA1201	DF4HA1201	1 200
110	195	ATS48C21p	ATS48C25p	NSX250pMA (2)	220	LC1F225	GS1N	DF2HA1201	DF4HA1201	1 200
132	233	ATS48C25p	ATS48C32p	NSX400p (2)	320	LC1F265	GS1QQ	DF2JA1251	DF4JA1251	2 250
				Micrologic 1.3M						
160	285	ATS48C32p	ATS48C41p	NSX400p (2)	320	LC1F330	GS1QQ	DF2JA1311	DF4JA1311	2 315
				Micrologic 1.3M						
220	388	ATS48C41p	ATS48C48p	NSX630p (2)	500	LC1F400	GS1S	DF2KA1401	DF4KA1401	3 400
				Micrologic 1.3M						
250	437	ATS48C48p	ATS48C59p	NSX630p (2)	500	LC1F500	GS1S	DF2KA1501	DF4KA1501	3 500
				Micrologic 1.3M						
315	560	ATS48C59p	ATS48C66p	NS630bp (2)	630	LC1F630	GS1S	DF2KA1631	DF4KA1631	3 630
				Micrologic 5.0 LR Off						
355	605	ATS48C66p	ATS48C79p	NS800p (2)	800	LC1F780	GS1V	DF2LA1631	DF4LA1631	4 630
				Micrologic 5.0 LR Off						
400	675	ATS48C79p	ATS48M10p	NS800p (2)	800	LC1F780	GS1V	DF2LA1801	DF4LA1801	4 800
				Micrologic 5.0 LR Off						
500	855	ATS48M10p	ATS48M12p	NS1000p (2)	1000	LC1BM33	GS1V	DF2LA1101	DF4LA1101	4 1000
				Micrologic 5.0 LR Off						
630	1045	ATS48M12p	-	NS1250p (2)	1250	LC1BP33	-	DF2LA1251	DF4LA1251	4 1250
				Micrologic 5.0 LR Off						

- (1) Replace p with Q or Y according to the starter's voltage range.
- (2) Replace p with F, N, H, S, L or LB according to the breaking capacity (see the breaking capacity table below).
- (3) DF2CA, DFpEA, DFpFA: sold in lots of 20.  
DFpGA, DFpKA: sold in lots of 3.  
DFpLA: sold singly.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Breaking capacity of circuit-breakers according to standard IEC 60947-4-2						
Starter	Iq (kA)	380 V, 400 V, 415 V		Icu (kA)				
		GV2L20, GV2L22, GV2L32, GV3L40, GV3L50, GV3L65	50					
ATS48D17p to ATS48C32p	50	380 V, 400 V, 415 V		Icu (kA)				
ATS48C41p to ATS48M12p	70		F	N	H	S	L	LB
		NS80HMA	-	-	70	-	-	-
		NSX100/160/250	36	50	70	100	150	-
		NSX400/630	36	50	70	100	150	-
		NS630b/800	-	50	70	-	150	200
		NS1000	-	50	70	-	150	-
		NS1250	-	50	70	-	-	-

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

380 V, 400 V, 415 V power supply

Type 2 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2: circuit-breakers, contactors, fast-acting fuses, starters

Combination: circuit-breaker, contactor, starter

Motor		Starter (1)		Circuit-breaker		Type of contactor
kW	A	Class 10	Class 20	Reference	Rating A	
		Standard applications	Severe applications			
M1		A1		Q1		KM1, KM2, KM3
5..5	11	-	ATS48D17p	GV2L20 NS80HMA	18 12..5	LC1D25 LC1D40
7..5	14..8	ATS48D17p	ATS48D22p	GV2L20 NS80HMA	18 25	LC1D25 LC1D40
11	21	ATS48D22p	ATS48D32p	GV2L22 NS80HMA	25 25	LC1D25 LC1D40
15	28..5	ATS48D32p	ATS48D38p	GV2L32 NS80HMA	32 50	LC1D32 LC1D80
18..5	35	ATS48D38p	ATS48D47p	GV3L40 NS80HMA	40 50	LC1D50A LC1D80
22	42	ATS48D47p	ATS48D62p	GV3L50 NS80HMA	50 50	LC1D50A LC1D80
30	57	ATS48D62p	ATS48D75p	GV3L65 NS80HMA	65 80	LC1D65A LC1D80
37	69	ATS48D75p	ATS48D88p	NS80HMA	80	LC1D80
45	81	ATS48D88p	ATS48C11p	NSX100pMA (2)	100	LC1D115/F115
55	100	ATS48C11p	ATS48C14p	NSX160pMA (2)	150	LC1D115/F115
75	131	ATS48C14p	ATS48C17p	NSX100pMA (2)	150	LC1D150/F150
90	162	ATS48C17p	ATS48C21p	NSX250pMA (2)	220	LC1F185
110	195	ATS48C21p	ATS48C25p	NSX250pMA (2)	220	LC1F225
132	233	ATS48C25p	ATS48C32p	NSX400p (2) Micrologic 1.3M	320	LC1F265
160	285	ATS48C32p	ATS48C41p	NSX400p (2) Micrologic 1.3M	320	LC1F330
220	388	ATS48C41p	ATS48C48p	NSX630p (2) Micrologic 1.3M	500	LC1F500
250	437	ATS48C48p	ATS48C59p	NSX630p (2) Micrologic 1.3M	500	LC1F500
315	560	ATS48C59p	ATS48C66p	NS630bL Micrologic 5.0 LR Off	630	LC1F630
355	605	ATS48C66p	ATS48C79p	NS800L or LB Micrologic 5.0 LR Off	800	LC1F780
400	675	ATS48C79p	ATS48M10p	NS800L or LB Micrologic 5.0 LR Off	800	LC1F780
500	855	ATS48M10p	ATS48M12p	NS1000L Micrologic 5.0 LR Off	1000	LC1BM33
630	1045	ATS48M12p	-	NS1250 (3) Micrologic 5.0 LR Off	1250	LC1BP33

(1) Replace p with Q or Y according to the starter's voltage range.

(2) Replace p with F, N, H, S, L or LB according to the breaking capacity (see the breaking capacity table below).

(3) Type 2 coordination is only possible if the fast-acting fuses remain in the motor supply circuit and are not bypassed at the end of starting.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Fast-acting fuse (essential for type 2 coordination) and starter combinations Starter	Fast-acting fuses with microswitch				
Starter	Iq (kA)		Reference	Unit	Size	Rating	I <sub>t</sub>
ATS48D17p	50	A1	Q3		A	kA <sub>2.s</sub>	
ATS48D22p to ATS48D47p	40	ATS48D17p	DF3ER50	14 x 51	50	2..3	
ATS48D62p to ATS48C79p	50	ATS48D22p and ATS48D32p	DF3FR80	22 x 58	80	5..6	
ATS48M10p and ATS48M12p	85	ATS48D38p and ATS48D47p	DF3FR100	22 x 58	100	12	
		ATS48D62p and ATS48D75p	DF400125	00	125	45	
		ATS48D88p and ATS48C11p	DF400160	00	160	82	
		ATS48C14p and ATS48C17p	DF430400	30	400	120	
		ATS48C21p to ATS48C32p	DF431700	31	700	490	
		ATS48D75p	DF433800	33	800	490	
		ATS48C48p and ATS48C59p	DF4331000	33	1000	900	
		ATS48C66p	DF42331400	2 x 33	1400	1200	
		ATS48C79p	DF4441600	44	1600	1600	
		ATS48M10p and ATS48M12p	DF4442200	44	2200	4100	

(4) DF3ER, DF3FR: sold in lots of 10.

DF4: sold singly.

Breaking capacity of circuit-breakers according to standard IEC 60947-4-2

380 V, 400 V, 415 V Icu (kA)

GV2L20, GV2L22, GV2L32, GV3L40, 50

GV3L50, GV3L65 Icu (kA)

380 V, 400 V, 415 V

	F	N	H	S	L	LB
NS80HMA	-	-	70	-	-	-
NSX100/160/250	36	50	70	100	150	-
NSX400/630	36	50	70	100	150	-
NS630b/800L/LB	-	-	-	-	150	200
NS1000L	-	-	-	-	150	-
NS1250	-	50	70	-	-	-



# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

440 V power supply

Type 1 coordination

Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2										
Use either a circuit-breaker (light green columns), contactor, starter combination or a switch/fuse (dark green columns), contactor, starter combination										
Motor	Starter		Circuit-breaker		Type of contactor	Type of switch or switch disconnecter (bare unit)	aM fuses			
	Class 10 Standard applications	Class 20 Severe applications	Reference	Rating			Unit reference (2)		Size	Rating
kW	A				A		Without striker	With striker		A
M1	A1		Q1		KM1, KM2, KM3					
5.5	10..4	-	ATS48D17Y	NSX100pMA (1)	12..5	LC1D12	LS1D32	DF2CA16	-	10 x 38 16
				NS80HMA	12..5	LC1D12	LS1D32	DF2CA16	-	10 x 38 16
7.5	13..7	ATS48D17Y	ATS48D22Y	NSX100pMA (1)	25	LC1D18	LS1D32	DF2CA16	-	10 x 38 16
				NS80HMA	25	LC1D18	LS1D32	DF2CA16	-	10 x 38 16
11	20..1	ATS48D22Y	ATS48D32Y	NSX100pMA (1)	25	LC1D25	GK1EK	DF2EA25	DF3EA25	14 x 51 25
				NS80HMA	25	LC1D25	GK1EK	DF2EA25	DF3EA25	14 x 51 25
15	26..5	ATS48D32Y	ATS48D38Y	NSX100pMA (1)	50	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51 32
				NS80HMA	50	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51 32
18.5	32..8	ATS48D38Y	ATS48D47Y	NSX100pMA (1)	50	LC1D40A	GK1EK	DF2EA40	DF3EA40	14 x 51 40
				NS80HMA	50	LC1D40A	GK1EK	DF2EA40	DF3EA40	14 x 51 40
22	39	ATS48D47Y	ATS48D62Y	NSX100pMA (1)	50	LC1D40A	GS1K	DF2FA50	DF3FA50	22 x 58 50
				NS80HMA	50	LC1D40A	GS1K	DF2FA50	DF3FA50	22 x 58 50
30	52	ATS48D62Y	ATS48D75Y	NSX100pMA (1)	100	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58 80
				NS80HMA	80	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58 80
37	64	ATS48D75Y	ATS48D88Y	NSX100pMA (1)	100	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58 80
				NS80HMA	80	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58 80
45	76	ATS48D88Y	ATS48C11Y	NSX100pMA (1)	100	LC1D115	GS1K	DF2FA100	DF3FA100	22 x 58 100
55	90	ATS48C11Y	ATS48C14Y	NSX100pMA (1)	100	LC1D115	GS1L	DF2GA1121	DF4GA1121	0 125
75	125	ATS48C14Y	ATS48C17Y	NSX160pMA (1)	150	LC1D150	GS1L	DF2GA1161	DF4GA1161	1 160
90	150	ATS48C17Y	ATS48C21Y	NSX250pMA (1)	220	LC1F185	GS1N	DF2HA1201	DF4HA1201	1 200
110	178	ATS48C21Y	ATS48C25Y	NSX250pMA (1)	220	LC1F225	GS1N	DF2HA1251	DF4HA1251	1 250
132	215	ATS48C25Y	ATS48C32Y	NSX250pMA (1)	220	LC1F265	GS1QQ	DF2JA1311	DF4JA1311	2 315
160	256	ATS48C32Y	ATS48C41Y	NSX400p (1)	320	LC1F265	GS1QQ	DF2JA1401	DF4JA1401	2 315
				Micrologic 1.3M						
220	353	ATS48C41Y	ATS48C48Y	NSX630p (1)	500	LC1F400	GS1S	DF2KA1501	DF4KA1501	3 500
				Micrologic 1.3M						
250	401	ATS48C48Y	ATS48C59Y	NSX630p (1)	500	LC1F400	GS1S	DF2KA1501	DF4KA1501	3 500
				Micrologic 1.3M						
355	549	ATS48C59Y	ATS48C66Y	NS630bp (1)	630	LC1F630	GS1V	DF2LA1801	DF4LA1801	4 800
				Micrologic 5.0 LR Off						
400	611	ATS48C66Y	ATS48C79Y	NS630bp (1)	630	LC1F630	GS1V	DF2LA1801	DF4LA1801	4 800
				Micrologic 5.0 LR Off						
500	780	ATS48C79Y	ATS48M10Y	NS800p (1)	800	LC1F780	GS1V	DF2LA1801	DF4LA1801	4 800
				Micrologic 5.0 LR Off						
630	965	ATS48M10Y	ATS48M12Y	NS1000p (1)	1000	LC1BP33	GS1V	DF2LA1101	DF4LA1101	4 1000
				Micrologic 5.0 LR Off						
710	1075	ATS48M12Y	-	NS1250p (1)	1250	LC1BP33	-	DF2LA1251	-	4 1250
				Micrologic 5.0 LR Off						

(1) Replace p with F, N, H, S, L or LB according to the breaking capacity (see the breaking capacity table below).

(2) DF2CA, DFpEA, DFpFA: sold in lots of 20.

DFpGA, DFpKA: sold in lots of 3.

DFpLA: sold singly.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Breaking capacity of circuit-breakers according to standard IEC 60947-4-2					
Starter	Iq (kA)	440 V			Icu (kA)		
ATS48D17Y to ATS48C32Y	50	GV2L20, GV2L22, GV2L32			20		
ATS48C41Y to ATS48M12Y	70	GV3L40, GV3L65			50		
		GK3EF80			25		
		440 V			Icu (kA)		
		F	N	H	S	L	LB
		NS80HMA	-	-	65	-	-
		NSX100/160/250	35	50	65	90	130
		NSX400/630	30	42	65	90	130
		NS630b/800	-	50	65	-	130 200
		NS1000	-	50	65	-	130 -
		NS1250	-	50	65	-	-

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

440 V power supply

Type 2 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2: circuit-breakers, contactors, fast-acting fuses, starters

Combination: circuit-breaker, contactor, starter

Motor		Starter		Circuit-breaker		Type of contactor
kW	A	Class 10	Class 20	Reference	Rating	
		Standard applications	Severe applications			
M1		A1		Q1		KM1, KM2, KM3
5..5	10..4	–	ATS48D17Y	NS80HMA NSX100pMA (1)	12..5 12..5	LC1D40 LC1D80
7..5	13..7	ATS48D17Y	ATS48D22Y	NS80HMA NSX100pMA (1)	25 25	LC1D40 LC1D80
11	20..1	ATS48D22Y	ATS48D32Y	NS80HMA NSX100pMA (1)	25 25	LC1D40 LC1D80
15	26..5	ATS48D32Y	ATS48D38Y	NSX100pMA (1) NS80HMA	50 50	LC1D80 LC1D80
18..5	32..8	ATS48D38Y	ATS48D47Y	NSX100pMA (1) NS80HMA	50 50	LC1D80 LC1D80
22	39	ATS48D47Y	ATS48D62Y	NSX100pMA (1) NS80HMA	50 50	LC1D80 LC1D80
30	52	ATS48D62Y	ATS48D75Y	NSX100pMA (1) NS80HMA	100 80	LC1D80 LC1D80
37	64	ATS48D75Y	ATS48D88Y	NSX100pMA (1) NS80HMA	100 80	LC1D80 LC1D80
45	76	ATS48D88Y	ATS48C11Y	NSX100pMA (1)	100	LC1D115
55	90	ATS48C11Y	ATS48C14Y	NSX100pMA (1)	100	LC1D115
75	125	ATS48C14Y	ATS48C17Y	NSX160pMA (1)	150	LC1D150
90	150	ATS48C17Y	ATS48C21Y	NSX160pMA (1)	150	LC1D150
110	178	ATS48C21Y	ATS48C25Y	NSX250pMA (1)	220	LC1F185
132	215	ATS48C25Y	ATS48C32Y	NSX400p (1) Micrologic 1.3M	320	LC1F265
160	256	ATS48C32Y	ATS48C41Y	NSX400p (1) Micrologic 1.3M	320	LC1F265
220	353	ATS48C41Y	ATS48C48Y	NSX630p (1) Micrologic 1.3M	500	LC1F400
250	401	ATS48C48Y	ATS48C59Y	NSX630p (1) Micrologic 1.3M	500	LC1F500
355	549	ATS48C59Y	ATS48C66Y	NS630bL/LB Micrologic 5.0 LR Off	630	LC1F630
400	611	ATS48C66Y	ATS48C79Y	NS800L/LB Micrologic 5.0 LR Off	800	LC1F800
500	780	ATS48C79Y	ATS48M10Y	NS800L/LB Micrologic 5.0 LR Off	800	LC1F780
630	965	ATS48M10Y	ATS48M12Y	NS1000L Micrologic 5.0 LR Off	1000	LC1BP33
710	1075	ATS48M12Y	–	NS1250p (1)(2) Micrologic 5.0 LR Off	1250	LC1BP33

(1) Replace p with F, N, H, S, L or LB according to the breaking capacity (see the breaking capacity table on page 18).

(2) Type 2 coordination is only possible if the fast-acting fuses remain in the motor supply circuit and are not bypassed at the end of starting.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2

Starter	Iq (kA)
ATS48D17Y	50
ATS48D22Y to ATS48D47Y	20
ATS48D62Y and ATS48D75Y	50
ATS48D88Y and ATS48C41Y	40
ATS48C11Y to ATS48C32Y	50
ATS48C48Y to ATS48C79Y	50
ATS48M10Y and ATS48M12Y	85

Fast-acting fuse (essential for type 2 coordination) and starter combinations

Starter Reference	Fast-acting fuses with microswitch			
	Unit reference (3)	Size	Rating A	I <sub>ct</sub> kA <sub>2.s</sub>
A1	Q3			
ATS48D17Y	DF3ER50	14 x 51	50	2..3
ATS48D22Y and ATS48D32Y	DF3FR80	22 x 58	80	5..6
ATS48D38Y and ATS48D47Y	DF3FR100	22 x 58	100	12
ATS48D62Y and ATS48D75Y	DF400125	00	125	45
ATS48D88Y and ATS48C11Y	DF400160	00	160	82
ATS48C14Y and ATS48C17Y	DF430400	30	400	120
ATS48C21Y to ATS48C32Y	DF431700	31	700	490
ATS48C41Y	DF433800	33	800	490
ATS48C48Y and ATS48C59Y	DF4331000	33	1000	900
ATS48C66Y	DF42331400	2 x 33	1400	1200
ATS48C79Y	DF4441600	44	1600	1600
ATS48M10Y and ATS48M12Y	DF4442200	44	2200	4100

(3) DF3ER, DF3FR: sold in lots of 10.

DF4: sold singly.

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

500 V power supply

Type 1 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2

Use either a circuit-breaker (light green columns), contactor, starter combination or a switch/fuse (dark green columns), contactor, starter combination

Motor	Starter		Circuit-breaker		Type of contactor	Type of switch or switch disconnecter (bare unit)	aM fuses				
	Class 10 Standard applications	Class 20 Severe applications	Reference	Rating A			Unit reference (2)		Size	Rating A	
							Without striker	With striker			
kW	A										
M1	A1		Q1		KM1, KM2, KM3						
7.5	12	-	ATS48D17Y	GV2L16 + LA9LB920	-	LC1D18	LS1D32	DF2CA16	-	10 x 38	16
				NS80HMA	12..5	LC1D32	-	-	-	-	-
				NSX100pMA (1)	12..5	LC1D40A	-	-	-	-	-
9	14	ATS48D17Y	ATS48D22Y	GV2L20 + LA9LB920	-	LC1D25	LS1D32	DF2CA16	-	10 x 38	16
				NS80HMA	25	LC1D32	-	-	-	-	-
				NSX100pMA (1)	25	LC1D40A	-	-	-	-	-
11	18.4	ATS48D22Y	ATS48D32Y	GV2L22 + LA9LB920	-	LC1D25	GK1EK	DF2EA25	DF3EA25	14 x 51	25
				NS80HMA	25	LC1D32	-	-	-	-	-
				NSX100pMA (1)	25	LC1D40A	-	-	-	-	-
18.5	28..5	ATS48D32Y	ATS48D38Y	GV2L32 + LA9LB920	-	LC1D32	GK1EK	DF2EA32	DF3EA32	14 x 51	32
				NS80HMA	50	LC1D40A	-	-	-	-	-
				NSX100pMA (1)	50	LC1D40A	-	-	-	-	-
22	33	ATS48D38Y	ATS48D47Y	NS80HMA	50	LC1D50A	GK1EK	DF2EA40	DF3EA40	14 x 51	40
				NSX100pMA (1)	50	LC1D50A	-	-	-	-	-
30	45	ATS48D47Y	ATS48D62Y	NS80HMA	50	LC1D50A	GS1K	DF2FA50	DF3FA50	22 x 58	50
				NSX100pMA (1)	50	LC1D50A	-	-	-	-	-
37	55	ATS48D62Y	ATS48D75Y	NSX100pMA (1)	100	LC1D65A	GS1K	DF2FA80	DF3FA80	22 x 58	80
45	65	ATS48D75Y	ATS48D88Y	NSX100pMA (1)	100	LC1D80	GS1K	DF2FA80	DF3FA80	22 x 58	80
55	80	ATS48D88Y	ATS48C11Y	NSX100pMA (1)	100	LC1D80	GS1K	DF2FA100	DF3FA100	22 x 58	100
75	105	ATS48C11Y	ATS48C14Y	NSX160pMA (1)	150	LC1D150/F115	GS1L	DF2GA1121	DF4GA1121	0	125
90	130	ATS48C14Y	ATS48C17Y	NSX160pMA (1)	150	LC1D150/F115	GS1L	DF2GA1161	DF4GA1161	0	160
110	156	ATS48C17Y	ATS48C21Y	NSX250pMA (1)	220	LC1F185	GS1N	DF2HA1201	DF4HA1201	1	200
132	207	ATS48C21Y	ATS48C25Y	NSX250pMA (1)	220	LC1F225	GS1N	DF2HA1251	DF4HA1251	1	250
160	257	ATS48C25Y	ATS48C32Y	NSX400p (1)	320	LC1F265	GS1QQ	DF2JA1311	DF4JA1311	2	315
				Micrologic 1.3M							
220	310	ATS48C32Y	ATS48C41Y	NSX630p (1)	500	LC1F400	GS1QQ	DF2JA1401	DF4JA1401	2	400
				Micrologic 1.3M							
250	360	ATS48C41Y	ATS48C48Y	NSX630p (1)	500	LC1F400	GS1S	DF2KA1501	DF4KA1501	3	500
				Micrologic 1.3M							
315	460	ATS48C48Y	ATS48C59Y	NSX630p (1)	500	LC1F500	GS1S	DF2KA1631	DF4KA1631	3	630
				Micrologic 1.3M							
400	540	ATS48C59Y	ATS48C66Y	NS630bp (1)	630	LC1F630	GS1V	DF2LA1801	DF4LA1801	4	800
				Micrologic 5.0 LR Off							
450	630	ATS48C66Y	ATS48C79Y	NS630bp (1)	630	LC1F780	GS1V	DF2LA1801	DF4LA1801	4	800
				Micrologic 5.0 LR Off							
500	680	ATS48C79Y	ATS48M10Y	NS800p (1)	800	LC1BL33	GS1V	DF2LA1801	DF4LA1801	4	800
				Micrologic 5.0 LR Off							
630	850	ATS48M10Y	ATS48M12Y	NS1000p (1)	1000	LC1BP33	GS1V	DF2LA1101	DF4LA1101	4	1000
				Micrologic 5.0 LR Off							
800	1100	ATS48M12Y	-	NS1250p (1)	1250	LC1BP33	-	DF2LA1251	-	4	1250
				Micrologic 5.0 LR Off							

(1) Replace p with N, H, S, L, R, HB1 or HB2 according to the breaking capacity (see the breaking capacity table below).

(2) DF2CA, DFpEA, DFpFA: sold in lots of 20. DFpGA, DFpKA: sold in lots of 3. DFpLA: sold singly.

### Breaking capacity of circuit-breakers according to standard IEC 60947-4-2

500 V	Icu (kA)						
GV2 + LA9LB920	100						
500 V	Icu (kA)						
	N	H	S	L	R	HB1	HB2
NS80HMA	-	25	-	-	-	-	-
NSX100	36	50	65	70	80	85	100
NSX160	36	50	65	70	-	-	-
NSX250/400/630	36	50	65	70	80	85	100
NS630b/800/1000L	-	-	-	100	-	-	-
NS1250	40	50	-	-	-	-	-

### Maximum starter prospective short-circuit current according to standard IEC 60947-4-2

Starter	Iq (kA)
ATS48D17Y to ATS48C32Y	50
ATS48C41Y to ATS48M12Y	70

# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units  
500 V power supply  
Type 2 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2: circuit-breakers, contactors, fast-acting fuses, starters

Combination: circuit-breaker, contactor, starter

Motor		Starter		Circuit-breaker		Type of contactor
kW	A	Class 10	Class 20	Reference	Rating A	
		Standard applications	Severe applications			
M1		A1		Q1		KM1, KM2, KM3
7..5	12	-	ATS48D17Y	GV2L16 + LA9LB920	-	LC1D25
				NS80HMA	12..5	LC1D40
				NSX100pMA (1)	12..5	LC1D80
9	14	ATS48D17Y	ATS48D22Y	GV2L20 + LA9LB920	-	LC1D25
				NS80HMA	25	LC1D40
				NSX100pMA (1)	25	LC1D80
11	18..4	ATS48D22Y	ATS48D32Y	GV2L22 + LA9LB920	-	LC1D25
				NS80HMA	25	LC1D40
				NSX100pMA (1)	25	LC1D80
18..5	28..5	ATS48D32Y	ATS48D38Y	GV2L32 + LA9LB920	-	LC1D25
				NS80HMA	50	LC1D40
				NSX100pMA (1)	50	LC1D80
22	33	ATS48D38Y	ATS48D47Y	NS80HMA	50	LC1D80
				NSX100pMA (1)	50	LC1D80
30	45	ATS48D47Y	ATS48D62Y	NS80HMA	50	LC1D80
				NSX100pMA (1)	50	LC1D80
37	55	ATS48D62Y	ATS48D75Y	NSX100pMA (1)	100	LC1D150/F115
45	65	ATS48D75Y	ATS48D88Y	NSX100pMA (1)	100	LC1D150/F115
55	80	ATS48D88Y	ATS48C11Y	NSX100pMA (1)	100	LC1D150/F115
75	105	ATS48C11Y	ATS48C14Y	NSX160pMA (1)	150	LC1F150
90	130	ATS48C14Y	ATS48C17Y	NSX160pMA (1)	150	LC1F185
110	156	ATS48C17Y	ATS48C21Y	NSX250pMA (1)	220	LC1F225
132	207	ATS48C21Y	ATS48C25Y	NSX250pMA (1)	220	LC1F330
160	257	ATS48C25Y	ATS48C32Y	NSX400p (1) Micrologic 1.3M	320	LC1F400
220	310	ATS48C32Y	ATS48C41Y	NSX400p (1) Micrologic 1.3M	320	LC1F400
250	360	ATS48C41Y	ATS48C48Y	NSX630p (1) Micrologic 1.3M	500	LC1F500
315	460	ATS48C48Y	ATS48C59Y	NSX630p (1) Micrologic 1.3M	500	LC1F500
400	540	ATS48C59Y	ATS48C66Y	NS630bL Micrologic 5.0 LR Off	630	LC1F630
450	630	ATS48C66Y	ATS48C79Y	NS630bL Micrologic 5.0 LR Off	630	LC1F800
500	680	ATS48C79Y	ATS48M10Y	NS800L Micrologic 5.0 LR Off	800	LC1BL33
630	850	ATS48M10Y	ATS48M12Y	NS1000L Micrologic 5.0 LR Off	1000	LC1BP33
800	1100	ATS48M12Y	-	NS1250p (1) (2) Micrologic 5.0 LR Off	1250	LC1BP33

(1) Replace p with N, H, S, L, R, HB1 or HB2 according to the breaking capacity (see the breaking capacity table below).

(2) Type 2 coordination is only possible if the fast-acting fuses remain in the motor supply circuit and are not bypassed at the end of starting.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Fast-acting fuse (essential for type 2 coordination) and starter combinations				
Starter	Iq (kA)	Starter Reference	Fast-acting fuses with microswitch			
			Unit reference(3)	Size	Rating A	I <sub>ct</sub> kA <sub>2s</sub>
ATS48D17Y	50	A1	Q3			
ATS48D22Y to ATS48D47Y	20	ATS48D17Y	DF3ER50	14 x 51	50	2..3
ATS48D62Y and ATS48D75Y	50	ATS48D22Y and ATS48D32Y	DF3FR80	22 x 58	80	5..6
ATS48D88Y	40	ATS48D38Y and ATS48D47Y	DF3FR100	22 x 58	100	12
ATS48C11Y to ATS48C32Y	50	ATS48D62Y and ATS48D75Y	DF400125	00	125	45
ATS48C41Y	40	ATS48D88Y and ATS48C11Y	DF400160	00	160	82
ATS48C48Y to ATS48C79Y	50	ATS48C14Y and ATS48C17Y	DF430400	30	400	120
ATS48M10Y and ATS48M12Y	85	ATS48C21Y to ATS48C32Y	DF431700	31	700	490
		ATS48C41Y	DF433800	33	800	490
		ATS48C48Y and ATS48C59Y	DF4331000	33	1000	900
		ATS48C66Y	DF42331400	2 x 33	1400	1200
		ATS48C79Y	DF4441600	44	1600	1600
		ATS48M10Y and ATS48M12Y	DF4442200	44	2200	4100
Breaking capacity of circuit-breakers according to standard IEC 60947-4-2						
500 V		Icu (kA)				
GV2 + LA9LB920		100				
500 V		Icu (kA)				
	N	H	S	L	R	HB1 HB2
NS80HMA	-	25	-	-	-	-
NSX100	36	50	65	70	80	85 100
NSX160	36	50	65	70	-	-
NSX250/400/630	36	50	65	70	80	85 100
NS630b/800/1000L	-	-	-	100	-	-
NS1250	40	50	-	-	-	-

(3) DF3ER, DF3FR: sold in lots of 10. DF4: sold singly.

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### 690 V power supply

### Type 1 coordination

Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2										
Use either a circuit-breaker (light green columns), contactor, starter combination or a switch/fuse (dark green columns), contactor, starter combination										
Motor		Starter		Circuit-breaker		Type of contactor	Type of switch or switch disconnecter (bare unit)	aM fuses		
								Reference	Rating	Unit reference (2)
kW	A	Class 10 Standard applications	Class 20 Severe applications		A			Without striker	With striker	A
M1		A1		Q1		KM1, KM2, KM3				
11	12..1	–	ATS48D17Y	GV2L16 + LA9LB920	–	LC1D18	GS1K	DF2FA16	DF3FA16	22 x 58 16
15	16..5	ATS48D17Y	ATS48D22Y	GV2L20 + LA9LB920	–	LC1D25	GS1K	DF2FA20	DF3FA20	22 x 58 20
				NSX100pMA (1)	25	LC1D25	–	–	–	–
18..5	20..2	ATS48D22Y	ATS48D32Y	GV2L22 + LA9LB920	–	LC1D32	GS1K	DF2FA25	DF3FA25	22 x 58 25
				NSX100pMA (1)	50	LC1D32	–	–	–	–
22	24..2	ATS48D32Y	ATS48D38Y	GV2L32 + LA9LB920	–	LC1D32	GS1K	DF2FA32	DF3FA32	22 x 58 32
				NSX100pMA (1)	50	LC1D40A	–	–	–	–
30	33	ATS48D38Y	ATS48D47Y	NSX100pMA (1)	50	LC1D40A	GS1K	DF2FA40	DF3FA40	22 x 58 40
37	40	ATS48D47Y	ATS48D62Y	NSX100pMA (1)	50	LC1D65A	GS1K	DF2FA50	DF3FA50	22 x 58 50
45	49	ATS48D62Y	ATS48D75Y	NSX100pMA (1)	100	LC1D80	–	–	–	–
55	58	ATS48D75Y	ATS48D88Y	NSX100pMA (1)	100	LC1D-115	–	–	–	–
75	75..5	ATS48D88Y	ATS48C11Y	NSX100pMA (1)	100	LC1D-115	–	–	–	–
90	94	ATS48C11Y	ATS48C14Y	NSX160pMA (1)	150	LC1D-150	–	–	–	–
110	113	ATS48C14Y	ATS48C17Y	NSX160LpMA (1)	150	LC1D-150	–	–	–	–
160	165	ATS48C17Y	ATS48C21Y	NSX250pMA (1)	220	LC1F-265	–	–	–	–
200	203	ATS48C21Y	ATS48C25Y	NSX400Lp (1)	320	LC1F-330	–	–	–	–
				Micrologic 1.3M						
250	253	ATS48C25Y	ATS48C32Y	NSX400p (1)	320	LC1F-400	–	–	–	–
				Micrologic 1.3M						
315	321	ATS48C32Y	ATS48C41Y	NSX630p (1)	500	LC1F-500	–	–	–	–
				Micrologic 1.3M						
400	390	ATS48C41Y	ATS48C48Y	NSX630LB	500	LC1F630	–	–	–	–
				Micrologic 1.3M						
500	490	ATS48C48Y	ATS48C59Y	NS630bLB	630	LC1BL33	–	–	–	–
				Micrologic 5.0 LR Off						
560	549	ATS48C59Y	ATS48C66Y	NS630bLB	630	LC1BL33	–	–	–	–
				Micrologic 5.0 LR Off						
630	605	ATS48C66Y	ATS48C79Y	NS800LB	800	LC1BP33	–	–	–	–
				Micrologic 5.0 LR Off						
710	694	ATS48C79Y	ATS48M10Y	NS800LB	800	LC1BP33	–	–	–	–
				Micrologic 5.0 LR Off						
900	880	ATS48M10Y	ATS48M12Y	NS1000p (1)	1000	LC1BR33	–	–	–	–
				Micrologic 5.0 LR Off						
950	1000	ATS48M12Y	–	NS1250p (1)	1250	LC1BR33	–	–	–	–
				Micrologic 5.0 LR Off						

(1) Replace p with N, H, S, L, R, HB1, HB2 or LB according to the breaking capacity (see the breaking capacity table below).

(2) DFpFA: sold in lots of 10.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Breaking capacity of circuit-breakers according to standard IEC 60947-4-2								
Starter	Iq (kA)	690 V			Icu (kA)					
ATS48D17Y to ATS48C32Y	50	GV2 + LA9LB920			50					
ATS48C41Y to ATS48M12Y	70	690 V			Icu (kA)					
		N	H	S	L	R	HB1	HB2	LB	
		NSX100	8	10	10	15	45	75	100	–
		NSX160	8	10	10	15	–	–	–	–
		NSX250	8	10	10	15	45	75	100	–
		NSX400/630	10	10	20	25	45	75	100	–
		NS630b/800LB	–	–	–	–	–	–	–	75
		NS1250	30	42	–	–	–	–	–	–



# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units  
690 V power supply  
Type 2 coordination

## Compatible components according to standards IEC 60947-4-1 and IEC 60947-4-2: circuit-breakers, contactors, fast-acting fuses, starters

Combination: circuit-breaker, contactor, starter

Motor		Starter		Circuit-breaker		Type of contactor
kW	A	Class 10	Class 20	Reference	Rating A	
		Standard applications	Severe applications			
M1		A1		Q1		KM1, KM2, KM3
11	12..1	–	ATS48D17Y	NSX100pMA (1)	25	LC1D80
15	16..5	ATS48D17Y	ATS48D22Y	NSX100pMA (1)	25	LC1D80
18..5	20..2	ATS48D22Y	ATS48D32Y	NSX100pMA (1)	25	LC1D80
22	24..2	ATS48D32Y	ATS48D38Y	NSX100pMA (1)	25	LC1D80
30	33	ATS48D38Y	ATS48D47Y	NSX100pMA (1)	50	LC1D150/F115
37	40	ATS48D47Y	ATS48D62Y	NSX100pMA (1)	50	LC1D150/F115
45	49	ATS48D62Y	ATS48D75Y	NSX100pMA (1)	100	LC1D150/F115
55	58	ATS48D75Y	ATS48D88Y	NSX100pMA (1)	100	LC1D150/F115
75	75..5	ATS48D88Y	ATS48C11Y	NSX100pMA (1)	100	LC1D150/F115
90	94	ATS48C11Y	ATS48C14Y	NSX250pMA (1)	150	LC1F150
110	113	ATS48C14Y	ATS48C17Y	NSX250pMA (1)	150	LC1F185
160	165	ATS48C17Y	ATS48C21Y	NSX250pMA (1)	220	LC1F330
200	203	ATS48C21Y	ATS48C25Y	NSX250pMA (1)	220	LC1F330
250	253	ATS48C25Y	ATS48C32Y	NSX400pMA (1)	320	LC1F400
315	321	ATS48C32Y	ATS48C41Y	NSX630pMA (1)	500	LC1F500
400	390	ATS48C41Y	ATS48C48Y	NSX630pMA (1)	500	LC1F630
500	490	ATS48C48Y	ATS48C59Y	NS630bLB Micrologic 5.0 LR Off	630	LC1F630
560	549	ATS48C59Y	ATS48C66Y	NS630bLB Micrologic 5.0 LR Off	630	LC1F630
630	605	ATS48C66Y	ATS48C79Y	NS800LB Micrologic 5.0 LR Off	800	LC1F780
710	694	ATS48C79Y	ATS48M10Y	NS800LB Micrologic 5.0 LR Off	800	LC1F780
900	880	ATS48M10Y	ATS48M12Y	NS1000 (2) Micrologic 5.0 LR Off	1000	LC1BR33
950	1000	ATS48M12Y	–	NS1250 (2) Micrologic 5.0 LR Off	1250	LC1BR33

(1) Replace p with HB1 or HB2 according to the breaking capacity (see the breaking capacity table below).

(2) Type 2 coordination is only possible if the fast-acting fuses remain in the motor supply circuit and are not bypassed at the end of starting.

Maximum starter prospective short-circuit current according to standard IEC 60947-4-2		Fast-acting fuse (essential for type 2 coordination) and starter combinations				
Starter	Iq (kA)	Starter Reference	Fast-acting fuses with microswitch			
			Unit reference (3)	Size	Rating A	I <sub>2t</sub> kA.s
ATS48D17Y	50					
ATS48D22Y to ATS48D47Y	20	A1	Q3			
ATS48D62Y and ATS48D75Y	50	ATS48D17Y	DF3ER50	14 x 51	50	2..3
ATS48D88Y	40	ATS48D22Y and ATS48D32Y	DF3FR80	22 x 58	80	5..6
ATS48C11Y to ATS48C32Y	50	ATS48D38Y and ATS48D47Y	DF3FR100	22 x 58	100	12
ATS48C41Y	40	ATS48D62Y and ATS48D75Y	DF400125	00	125	45
ATS48C48Y to ATS48C79Y	50	ATS48D88Y and ATS48C11Y	DF400160	00	160	82
ATS48M10Y and ATS48M12Y	85	ATS48C14Y and ATS48C17Y	DF430400	30	400	120
ATS48D17Y	50	ATS48C21Y to ATS48C32Y	DF431700	31	700	490
		ATS48C41Y	DF433800	33	800	490
		ATS48C48Y and ATS48C59Y	DF4331000	33	1000	900
		ATS48C66Y	DF42331400	2 x 33	1400	1200
		ATS48C79Y	DF4441600	44	1600	1600
		ATS48M10Y and ATS48M12Y	DF4442200	44	2200	4100

(3) DF3ER, DF3FR: sold in lots of 10.

DF4: sold singly.

Breaking capacity of circuit-breakers according to standard IEC 60947-4-2

690 V	Icu (kA)				
GV2 + LA9LB920	50				
690 V	Icu (kA)				
	N	H	HB1	HB2	LB
NSX100/250	–	–	75	100	–
NSX400/630	–	–	75	100	–
NS630b/800LB	–	–	–	–	75
NS1000/1250	30	42	–	–	–

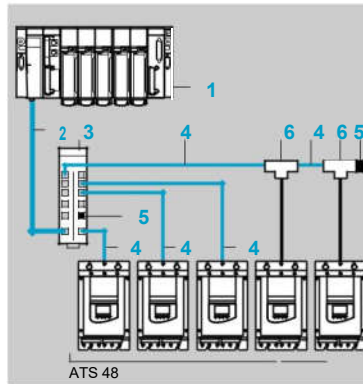
# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units  
Communication options

## Modbus serial link

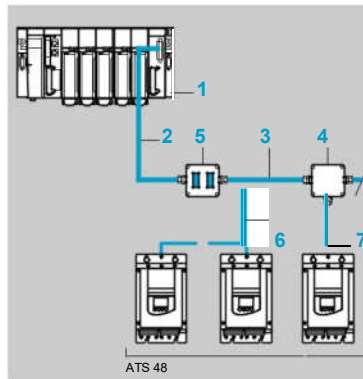
The Altistart 48 is connected directly to the Modbus bus via its RJ45 connector port.. This port supports the RS 485 (2-wire) standard and the Modbus RTU protocol.. The communication function provides access to the starter's configuration, adjustment, control and signaling functions..

### Connections via splitter boxes and RJ45 connectors



- 1 PLC (1)..
- 2 Modbus cable depending on the controller or PLC type..
- 3 Modbus splitter box **LU9GC3..**
- 4 Modbus drop cables **VW3A8306Rpp..**
- 5 Line terminators **VW3A8306RC..**
- 6 Modbus T-junction boxes **VW3A8306TFpp (with cable)..**

### Connections via tap junctions



- 1 PLC (1)..
- 2 Modbus cable depending on the controller or PLC type..
- 3 Modbus cable **TSXCSp00..**
- 4 Junction box **TSXSCA50..**
- 5 Subscriber socket **TSXSCA62..**
- 6 Modbus drop cable **VW3A8306..**
- 7 Modbus drop cable **VW3A8306D30..**

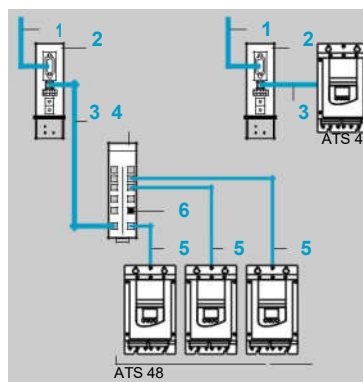
### Connection via screw terminals

In this case, use a Modbus drop cable **VW3A8306D30** and line terminators **VW3A8306DRC..**

## Other communication buses

The Altistart 48 can also be connected to Ethernet, Fipio, Profibus DP and DeviceNet networks via a module (bridge or gateway).. Communication on the network is used for:  
b controlling,  
b monitoring and,  
b adjusting the connected Modbus devices..

### Connection via modules



- 1 To network..
- 2 Communication modules..
- 3 Cables **VW3A8306Rpp, VW3P07306R10** or **VW3A8306D30..**
- 4 Modbus splitter box **LU9GC3..**
- 5 Modbus drop cables **VW3A8306Rpp..**
- 6 Line terminator **VW3A8306RC..**

(1) Please refer to our specialist "Modicon Premium automation platform" and "Modicon TSX Micro automation platform" catalogs.

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

### Communication options

109203

LU9GC3

Modbus serial link					
Connection accessories					
Description		Reference	Weight	kg/ lb	
<b>Tap junction</b> 3 screw terminals and RC line terminator To be connected using cable VW3A8306D30		<b>TSXSCA50</b>	0..520/ 1.156		
<b>Subscriber socket</b> 2 x 15-way female SUB-D connectors and 2 sets of screw terminals, RC line terminator To be connected using cable VW3A8306		<b>TSXSCA62</b>	0..570/ 1.257		
<b>Modbus splitter box</b> 8 RJ45 connectors and 1 set of screw terminals		<b>LU9GC3</b>	0..500/ 1.102		
<b>Line terminators</b> (1)	For RJ45 connector	R = 120 W, C = 1 nf	<b>VW3A8306RC</b>	0..200/ 0.441	
		R = 150 W	<b>VW3A8306R</b>	0..200/ 0.441	
	For screw terminals	R = 120 W, C = 1 nf	<b>VW3A8306DRC</b>	0..200/ 0.441	
		R = 150 W	<b>VW3A8306DR</b>	0..200/ 0.441	
	<b>Modbus T-junction boxes</b>	With integrated cable 0..3 m/0.98 ft	<b>VW3A8306TF03</b>	–	
		With integrated cable 1 m/3.28 ft	<b>VW3A8306TF10</b>	–	
Connection cables					
Description	Length m/ ft	Connectors	Reference	Weight kg/ lb	
<b>Cables for Modbus bus</b>	3/ 9.84	1 RJ45 connector and a stripped end	<b>VW3A8306D30</b>	0..150/ 0.331	
	3/ 9.84	1 RJ45 connector and 1 x 15-way male SUB-D connector for TSXSCA62	<b>VW3A8306</b>	0..150/ 0.331	
	0..3/ 0.98	2 RJ45 connectors	<b>VW3A8306R03</b>	0..050/ 0.110	
	1/ 3.28	2 RJ45 connectors	<b>VW3A8306R10</b>	0..050/ 0.110	
	3/ 9.84	2 RJ45 connectors	<b>VW3A8306R30</b>	0..150/ 0.331	
<b>Cables for Profibus DP</b>	1/ 3.28	2 RJ45 connectors	<b>VW3P07306R10</b>	0..050/ 0.110	
<b>RS 485 double shielded twisted pair cables</b>	100/ 328.08	Supplied without connector	<b>TSXCSA100</b>	–	
	200/ 656.17	Supplied without connector	<b>TSXCSA200</b>	–	
	500/ 1640.42	Supplied without connector	<b>TSXCSA500</b>	–	
Other communication buses					
Description	Cables to be connected	Reference	Weight	kg/ lb	
<b>Ethernet/Modbus bridge</b> with 1 Ethernet 10baseT port (RJ45 type)	VW3A8306D30	<b>174CEV30010</b> (2)	0..500/ 1.102		
<b>Fipio/Modbus gateway</b>	VW3A8306Rpp	<b>LUFP1</b>	0..240/ 0.529		
<b>DeviceNet/Modbus gateway</b>	VW3A8306Rpp	<b>LUFP9</b>	0..240/ 0.529		
<b>Profibus DP/Modbus gateway</b> Parameters set using standard Profibus DP configurator, Hilscher Sycon type	VW3P07306R10	<b>LA9P307</b>	0..240/ 0.529		
<b>Profibus DP/Modbus gateway</b> Parameters set using ABC Configurator software	VW3A8306Rpp	<b>LUFP7</b>	0..240/ 0.529		

108516



LUFP1



LA9P307

(1) Sold in lots of 2.

(2) Please refer to the "Modicon Premium and PL7 software automation platform" catalog.

# Soft starters for asynchronous motors

## Altistart 48 soft start/soft stop units

Options: remote terminal, line chokes and

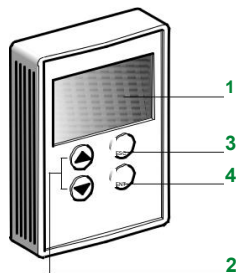
DNV kits

### Remote terminal

The terminal can be mounted on the door of a wall-fixing or floor-standing enclosure. It has the same signaling display and configuration buttons as the terminal integrated in the starter. A menu access locking switch is located on the rear of the terminal.

The option comprises:

- the remote terminal,
- a mounting kit containing a cover, screws and an IP 54 seal on the front panel,
- a connection cable 3 m/9.84 ft long, with a 9-way SUB-D connector at the terminal end and an RJ45 connector at the Altistart 48 end.



- 1 Information is displayed in the form of codes or values in three 7-segment displays..
- 2 Buttons for scrolling through the menus or modifying values..
- 3 "ESC": Button for exiting the menus (no confirmation).
- 4 "ENT": Confirm button for entering a menu or confirming the new value selected..

### Line chokes

The use of line chokes is recommended in particular when installing several electronic starters on the same line supply. The inductance values are defined for a voltage drop between 3% and 5% of the nominal line voltage. Install the line choke between the line contactor and the starter.

### DNV kits

These kits enable ATS48D62p.... .48M12p starters to meet the requirements of the DNV certification body.

Each kit consists of the fixing pins and the parts necessary for mounting the starter (when mounting using the VW3G48107 kit a sling must be used, which is not included).

ATS48D17p.... .48D47p starters are DNV certified and it is not necessary to add an optional kit.

### Protective covers for power terminals

To be used with eyelet connectors

ATS48C14p and ATS48C17p soft start/soft stop units have 9 unprotected power terminals. These terminals can be fitted with protective covers for compliance with IP 20 degree of protection.

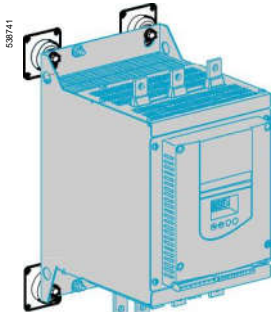
# Soft starters for asynchronous motors

Altistart 48 soft start/soft stop units

Options: remote terminal, line chokes, DNV kits, protective covers and documentation



VW3G48101



VW3G48106



LA9F702

## Remote terminal

Description	Reference	Weight kg/ lb
<b>Remote terminal</b> with a connection cable 3 m/9.84 ft long, with 9-way SUB-D connectors at the terminal end and RJ45 at the Altistart 48 end	<b>VW3G48101</b>	0..200/ 0.441

## Line chokes

For starters	Value of the choke mH	Nominal current A	Degree of protection	Reference	Weight kg/ lb
ATS48D17p	1..7	15	IP 20	<b>VZ1L015UM17T</b>	2..100/ 4.630
ATS48D22p	0..8	30	IP 20	<b>VZ1L030U800T</b>	4..100/ 9.039
ATS48D32p and 48D38p	0..6	40	IP 20	<b>VZ1L040U600T</b>	5..100/ 11.244
ATS48D47p and 48D62p	0..35	70	IP 20	<b>VZ1L070U350T</b>	8..000/ 17.637
ATS48D75p....48C14p	0..17	150	IP 00	<b>VZ1L150U170T</b>	14..900/ 32.849
ATS48C17p....48C25p	0..1	250	IP 00	<b>VZ1L250U100T</b>	24..300/ 53.572
ATS48C32p	0..075	325	IP 00	<b>VZ1L325U075T</b>	28..900/ 63.714
ATS48C41p and 48C48p	0..045	530	IP 00	<b>VZ1L530U045T</b>	37..000/ 81.571
ATS48C59p....48M10p	0..024	1025	IP 00	<b>VZ1LM10U024T</b>	66..000/ 145.505
ATS48M12p	0..016	1435	IP 00	<b>VZ1LM14U016T</b>	80..000/ 176.370

*Note: Line chokes with IP 00 degree of protection must be fitted with a protective bar to protect personnel from electrical contact.*

## DNV kits

For starters	Reference	Weight kg/ lb
ATS48D62p....48C17p	<b>VW3G48106</b>	0..600/ 1.323
ATS48C21p....48C32p	<b>VW3G48107</b>	0..680/ 1.499
ATS48C41p....48C66p	<b>VW3G48108</b>	3..400/ 7.496
ATS48C79p....48M12p	<b>VW3G48109</b>	4..400/ 9.700

## Protective covers for power terminals

To be used with eyelet connectors

For starters	Number of covers per set	Reference	Weight kg/ lb
ATS48C14p and ATS48C17p	6 (1)	<b>LA9F702</b>	0..250/ 0.551

(1) The starters have 9 unprotected power terminals.

174CEV30010	25	ATS48D75Q	10
			11
<b>A</b>		ATS48D75Y	12
ATS48C11Q	10		13
	11	ATS48D88Q	10
ATS48C11Y	12		11
	13	ATS48D88Y	12
ATS48C14Q	10		13
	11	ATS48M10Q	10
ATS48C14Y	12		11
	13	ATS48M10Y	12
ATS48C17Q	10		13
	11	ATS48M12Q	10
ATS48C17Y	12		11
	13	ATS48M12Y	12
ATS48C21Q	10		13
	11	<b>L</b>	
ATS48C21Y	12	LA9F702	27
	13	LA9P307	25
ATS48C25Q	10	LU9GC3	25
	11	LUFPP1	25
ATS48C25Y	12	LUFPP7	25
	13	LUFPP9	25
ATS48C32Q	10	<b>T</b>	
	11	TSXCSA100	25
ATS48C32Y	12	TSXCSA200	25
	13	TSXCSA500	25
ATS48C41Q	10	TSXSCA50	25
	11	TSXSCA62	25
ATS48C41Y	12	<b>V</b>	
	13	VW3A8306	25
ATS48C48Q	10	VW3A8306D30	25
	11	VW3A8306DR	25
ATS48C48Y	12	VW3A8306DRC	25
	13	VW3A8306R	25
ATS48C59Q	10	VW3A8306R03	25
	11	VW3A8306R10	25
ATS48C59Y	12	VW3A8306R30	25
	13	VW3A8306RC	25
ATS48C66Q	10	VW3A8306TF03	25
	11	VW3A8306TF10	25
ATS48C66Y	12	VW3G48101	27
	13	VW3G48106	27
ATS48C79Q	10	VW3G48107	27
	11	VW3G48108	27
ATS48C79Y	12	VW3G48109	27
	13	VW3P07306R10	25
ATS48D17Q	10	VZ1L015UM17T	27
	11	VZ1L030U800T	27
ATS48D17Y	12	VZ1L040U600T	27
	13	VZ1L070U350T	27
ATS48D22Q	10	VZ1L150U170T	27
	11	VZ1L250U100T	27
ATS48D22Y	12	VZ1L325U075T	27
	13	VZ1L530U045T	27
ATS48D32Q	10	VZ1LM10U024T	27
	11	VZ1LM14U016T	27
ATS48D32Y	12		
	13		
ATS48D38Q	10		
	11		
ATS48D38Y	12		
	13		
ATS48D47Q	10		
	11		
ATS48D47Y	12		
	13		
ATS48D62Q	10		
	11		
ATS48D62Y	12		
	13		



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