

SOFT STARTERS

Easy Selection Guide

MOTOR CONTROL AND DRIVES



Follow the “three Easy Steps” to select the right soft starter for your motor application.

step 1

STEP 1: Select your motor full load current rating

Soft starters are commonly used in motor applications.

Motor data ratings are referred to as the power of the motor in kW and the full load current (FLC) or nominal current in amps.

What is the kW and motor full load current?

Both of these ratings can be found on the name plate of the motor or directly from the motor manufacturer. When selecting a soft starter be sure to check the FLC rating is sufficient to run the motor.

Typical ratings for 3-phase motor @ 415 V AC

Motor kW	Approx. full load current @ 415 V AC	Motor kW	Approx. full load current @ 415 V AC	Motor kW	Approx. full load current @ 415 V AC
0.37	1	30	55	250	425
0.55	1.6	37	66	300	525
0.75	2	45	80	315	535
1.5	3.5	55	100	375	615
2.2	5	75	135	400	670
4	8.4	90	165	450	750
5.5	11	110	200	500	820
7.5	14	132	240	560	920
11	21	160	280	630	1020
15	28	185	325	700	1200
18.5	35	200	340	800	1380
22	40	220	390	900	1500

STEP 2: Select your Application

Soft starter product selection is influenced by the type of motor application. Find your application on the table below. Once the motor application is selected, note the corresponding duty category.

step 2

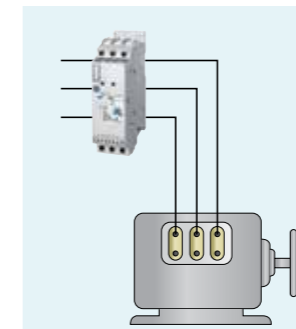
Category	Start condition
Light duty	3x FLC, 10 second start
Medium duty	3.5x FLC, 15 second start
Heavy duty	4x FLC, 20 second start
Severe duty	4.5x FLC, 30 second start

Application	Duty	Application	Duty	Application	Duty
Agitator	Heavy	Debarker	Medium	Palletiser	Severe
Atomiser	Heavy	Dryer	Severe	Planer	Medium
Bottle washer	Light	Dust collector	Medium	Press	Medium
Centrifuge	Severe	Edger	Medium	Pump - Bore	Light
Chipper	Severe	Fan - Axial (Damped)	Medium	Pump - Centrifugal	Medium
Compressor - Recip (Loaded)	Severe	Fan - Axial (Un-damped)	Severe	Pump - Positive displacement	Heavy
Compressor - Recip (Unloaded)	Heavy	Fan - Centrifugal (Damped)	Medium	Pump - Slurry	Severe
Compressor -Screw (Loaded)	Severe	Fan - Centrifugal (Un-damped)	Severe	Re-pulper	Severe
Compressor -Screw (Unloaded)	Heavy	Fan - High pressure	Severe	Rotary table	Heavy
Conveyor - Belt	Severe	Grinder	Medium	Sander	Heavy
Conveyor - Roller	Medium	Hydraulic power pack	Medium	Saw - Bandsaw	Severe
Conveyor Screw	Heavy	Mill	Severe	Saw - Circular	Medium
Crusher - Cone	Medium	Mill - Ball	Severe	Separator	Severe
Crusher - Jaw	Severe	Mill - Hammer	Severe	Shredder	Severe
Crusher - Rotary	Medium	Mill - Roller	Severe	Slicer	Light
Crusher - Vertical impact	Medium	Mixer	Severe	Tumbler	Heavy

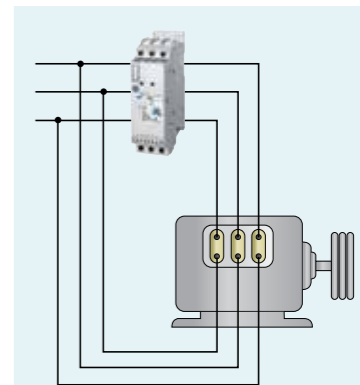
Note: The above table is a guide only. If your application is not on the above table contact NHP for recommendations.

step 3

STEP 3: Select your motor connection



Most common motor connection



Suitable for most motors. Convenient if replacing an existing star delta starter with a new soft starter

step 4

STEP 4: Select either the Allen-Bradley SMC-3 or SMC-Flex below

Using the table below and information from the following pages ask the customer which features are required.

Features	Allen-Bradley SMC-3	Allen-Bradley SMC-Flex
Catalogue Reference	150-C...	150-F...
Nominal current range	3 wire connection 4...480 A 6 wire connection 5.1...831 A	5...1250 A 8...1600 A
Supply Voltage	200...480 VAC	200...440 VAC 690 VAC variant also available
User Adjustments	DIP switches & rotary dial	Multi-line digital keypad with plain English LCD display (fixed keypad) Optional keypads available (removable handheld or fixed panel mount)
Operating Temperature	-5...50°C	-5...50°C
Internal Bypass Contacts	Yes, Standard	Yes, Standard
Electronic Motor Protection	Motor overload with adj. trip class Phase imbalance Phase loss / open load Phase sequence Starter over temperature Shorted SCR	Motor overload with adj. trip class Current imbalance Power loss / line fault Phase reversal Starter over temperature Shorted SCR Motor thermistor Excess starts/hour Jam / Stall Under-load Line unbalance Overvoltage and undervoltage Aux. input trip Communications fault Ground fault ¹⁾
Communication Options	Nil	EtherNet/IP DeviceNet Profibus ControlNet
Applications	Light, Medium duty	Light, Medium, Heavy, Severe duty
Page reference	4	8

¹⁾ Additional current transformer required. Consult NHP.

Allen-Bradley SMC-3

Providing users with consistent performance in a compact, space-saving design, the SMC-3 soft starter is an intelligent and cost-effective means to control your motor application. Providing installation flexibility, integral bypass, 3 wire / 6 wire motor connection, as well as choice of starting and stopping modes, the SMC-3 is ideal for many applications.

- Up to 480 A (3 wire) / 831 A (6 wire)
- Compact size, reducing panel space requirements
- Integral bypass, for minimal heat dissipation during run time
- True three phase control, for smoother starting and minimal thermal stress on the motor
- 3 wire / 6 wire motor connection for flexibility of installation
- Choice of starting and stopping modes:
 - Start: Soft Start, Current Limit, Kick-Start
 - Stop: Soft Stop, Coast to Stop
- Electronic Motor Protection:
 - Motor overload with adj. trip class (OFF, 10, 15, 20 seconds), phase imbalance, phase loss / open load, phase sequence, start over temperature, shorted SCR



DIN-rail mounting & screw fixing¹⁾

Complete with DIN-rail mounting and screw fixing, the SMC-3 is easy to install.

Test / reset button

This dual purpose button allows testing of the trip function without motor current flow and fault resetting under normal operating conditions. Optional remote or standard local reset for your convenience.

DIP switch set-up

Quick, accurate and repeatable settings are assured through a simple to use DIP switch selection panel.



Integral motor overload/fault contact

A normally open (N/O) fault contact for indication of motor overload/fault is included on the SMC-3.

Marking tag holder

Used with marking tags to provide quick and accurate starter identification.

Potentiometer

A clearly labeled potentiometer is used to adjust motor full load current setting. The lowest minimum Full Load Current (FLC) setting is one third of the soft starters' current rating. The motor connected must have an FLC within this range. E.g. 150-C9NBD has an overload range of 3 A to 9 A.

LED status indication

Clear indication of all motor and system fault conditions via a 'flash coded' LED.

Configurable Auxiliary Contacts

As standard, the SMC-3 provides a configurable (normal or up-to-speed) normally open (N/O) auxiliary contact for motor run status indication. The SMC-3 has a line of side-mount configurable (normal or up-to-speed) auxiliary contacts, allowing you more flexibility.



Notes:

¹⁾ DIN-rail mounting applicable to 150-C3... C85 only.

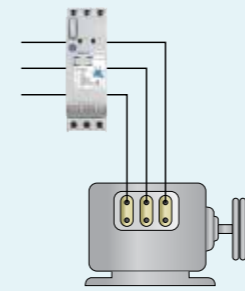
Ordering details

With knowledge of motor full load current, application duty category (page 3), motor power connection (page 3), the appropriate SMC-3 can be selected. 3 wire motor connection is the most common motor connection. Alternatively, 6 wire motor connection is suitable for most motors. 6 wire motor connection is a convenient option if replacing an existing star delta starter with a new soft starter.

SMC-3 maximum motor FLC ratings

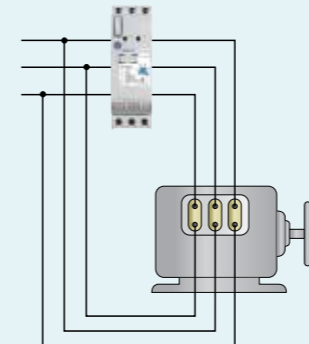
	Light Duty	Medium Duty	100-240 V AC Control Cat. No.	24 V AC/DC Control Cat. No.
	3 A	3 A	150-C3NBD	150-C3NBR
	9 A	9 A	150-C9NBD	150-C9NBR
	16 A	16 A	150-C16NBD	150-C16NBR
	19 A	19 A	150-C19NBD	150-C19NBR
	25 A	25 A	150-C25NBD	150-C25NBR
	30 A	30 A	150-C30NBD	150-C30NBR
	37 A	37 A	150-C37NBD	150-C37NBR
	43 A	43 A	150-C43NBD	150-C43NBR
	60 A	60 A	150-C60NBD	150-C60NBR
	85 A	85 A	150-C85NBD	150-C85NBR
	108 A	108 A	150-C108NBD	150-C108NBR
	135 A	116 A	150-C135NBD	150-C135NBR
	201 A	201 A	150-C201NBD	150-C201NBR
	251 A	222 A	150-C251NBD	150-C251NBR
	317 A	311 A	150-C317NBD	150-C317NBR
	361 A	311 A	150-C361NBD	150-C361NBR
	480 A	433 A	150-C480NBD	150-C480NBR
	5.1 A	5.1 A	150-C3NBD	150-C3NBR
	15 A	15 A	150-C9NBD	150-C9NBR
	27 A	27 A	150-C16NBD	150-C16NBR
	32 A	32 A	150-C19NBD	150-C19NBR
	43 A	43 A	150-C25NBD	150-C25NBR
	51 A	51 A	150-C30NBD	150-C30NBR
	64 A	64 A	150-C37NBD	150-C37NBR
	74 A	74 A	150-C43NBD	150-C43NBR
	103 A	103 A	150-C60NBD	150-C60NBR
	147 A	147 A	150-C85NBD	150-C85NBR
	187 A	187 A	150-C108NBD	150-C108NBR
	233 A	201 A	150-C135NBD	150-C135NBR
	347 A	347 A	150-C201NBD	150-C201NBR
	434 A	385 A	150-C251NBD	150-C251NBR
	548 A	539 A	150-C317NBD	150-C317NBR
	624 A	539 A	150-C361NBD	150-C361NBR
	830 A	749 A	150-C480NBD	150-C480NBR

3 wire motor connection



Ensure the SMC-3 maximum motor FLC rating is greater than or equal to the motor FLC rating.

6 wire motor connection



Ensure the SMC-3 maximum motor FLC rating is greater than or equal to the motor FLC rating.

Notes:

For heavy and severe duty loads refer to SMC-Flex, or consult NHP for recommendations.

As standard, the SMC-3 is capable of 3 wire and 6 wire motor connection. When using the SMC-3 in 6 wire mode, the overload current must be set to 58 % of the motor FLC. E.g. a 50 amp motor in 6 wire would use a 150-C30NBD and the overload current setting would be set to 29 Amps. Refer to NHP for additional technical information.

SMC-3 Accessories

Side-mounted auxiliary contacts ¹⁾	Cat. No.
1x N/O contact	150-CA10
1x N/C contact	150-CA01
2x N/O contacts	150-CA20
1x N/O and 1x N/C contact	150-CA11

Contactor connection modules	Cat. No.
Connects 100-C09...23 to 150-C3...19	150-CI23
Connects 100-C30...37 to 150-C3...37	150-CI37

Remote reset magnets	Cat. No.
24 V AC coil	193-ER1J
240 V AC coil	193-ER1A
24 V DC coil	193-ER1Z24

Optional Cooling fans ²⁾	Cat. No.
Frame 1: 150-C3...37	150-CF64
Frame 2: 150-C43...85	150-CF147

Marking tags	Cat. No.
Marking tag covers (x 100)	100-FMP
Transparent cover (x 100)	100-FMC
Marking tag stickers (x 100)	100-FMS

SMC-3 dimensions (mm) and weights (kg)

Cat. No.	Width	Height	Depth	kg
150-C3...37	45	140	102	0.86
150-C43...85	72	206	132	2.25
150-C108...135	196.4	443.7	205.2	15
150-C201...251	225	560	265.3	30.4
150-C317...480	290	600	298	45.8

Notes:
¹⁾ As standard, the SMC-3 includes a configurable (normal or up-to-speed) normally open (N/O) auxiliary contact.
²⁾ SMC-3 models 150-C43...C480 include a fan as standard. Replacement fans are available from NHP.

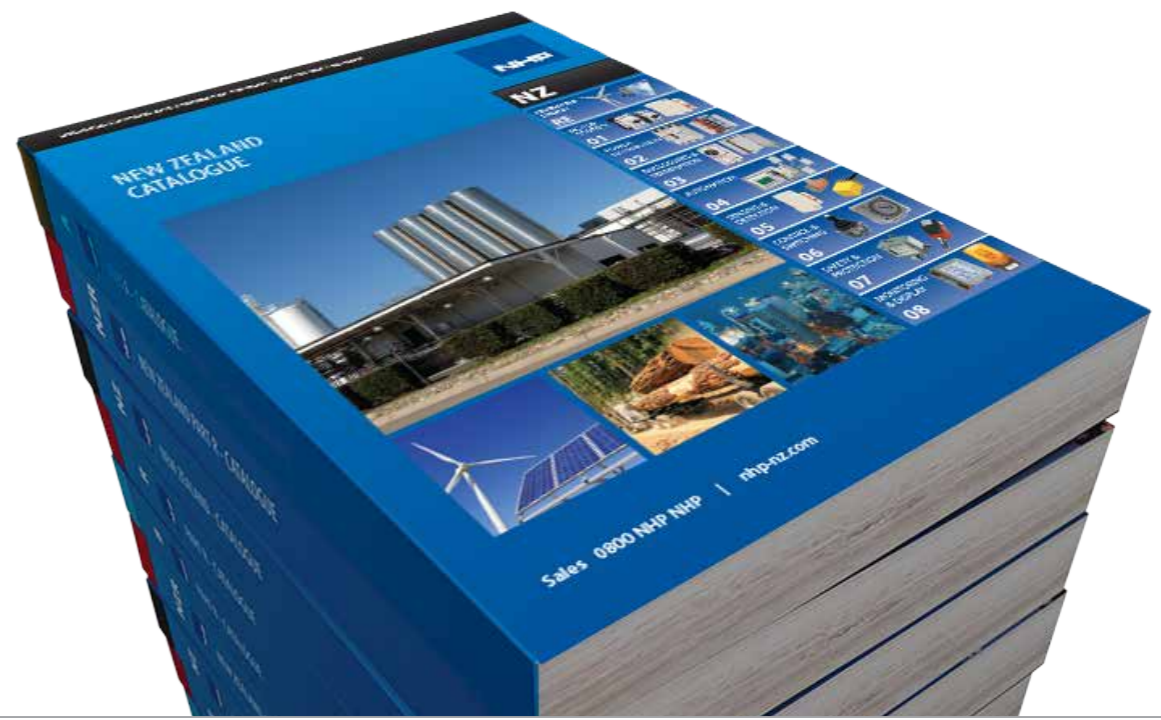
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Allen-Bradley SMC-Flex

Providing users with advanced motor control, protection and monitoring capabilities, the SMC-Flex soft starter is suitable for a vast range of industrial applications.

Easy to use and with numerous standard features, including integral bypass through-out the range, advanced LCD display, 3 wire / 6 wire motor connection, multiple starting and stopping modes, as well as numerous communication expansion capabilities, the SMC-Flex is considered by many to be the ultimate in soft starting.

- Up to 1250 A (3 wire) / 1600 A (6 wire)
- Integral bypass, for minimal heat dissipation during run time
- Extremely user friendly with plain English LCD display, for easy setup
- True three phase control, for smoother starting and minimal thermal stress on the motor
- 3 wire / 6 wire motor connection for flexibility of installation
- Standard starting and stopping modes:
 - Start: Soft Start, Current Limit, Kick-Start, Dual-Ramp Start, Full Voltage Start, Preset Slow Speed, Linear Speed Acceleration ¹⁾
 - Stop: Soft Stop, Coast to Stop
- Also available: pump control and braking control model variants. Consult NHP.
- Advanced Electronic Motor Protection:
 - Motor overload with adjustable trip class (OFF, 10, 15, 20 and 30), current imbalance, power loss / line fault, phase reversal, starter over temperature, shorted SCR, motor thermistor, excess starts/hour, jam, stall, under-load, line unbalance, overvoltage, undervoltage, aux. input trip, communications fault, ground fault
- Advanced power monitoring functions including three-phase current and voltage
- Optional communications:
 - EtherNet/IP, DeviceNet, Profibus, ControlNet
 - Consult NHP for complete list of optional network protocols.

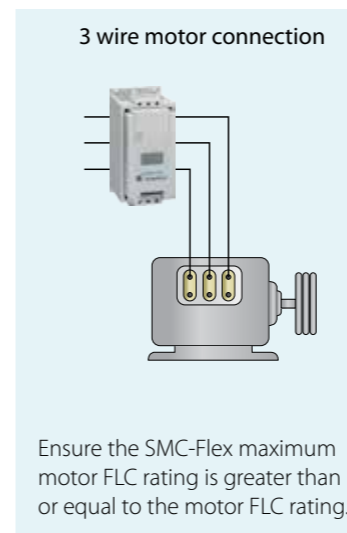
Notes:

¹⁾ Linear Speed Acceleration requires tach feedback (ordered separately).

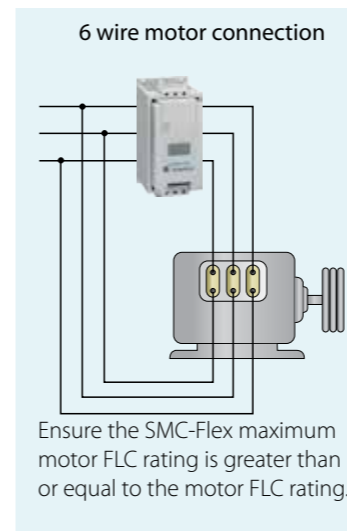
Ordering details

With knowledge of motor full load current, application duty category (page 3), motor power connection (page 3), the appropriate SMC-Flex can be selected. 3 wire motor connection is the most common motor connection. Alternatively, 6 wire motor connection is suitable for most motors. 6 wire motor connection is a convenient option if replacing an existing star delta starter with a new soft starter.

SMC-Flex maximum motor FLC ratings



Light Duty	Medium Duty	Heavy Duty	Severe Duty	100-240 V AC Control Cat. No.	24 V AC/DC Control Cat. No.
5 A	5 A	5 A	5 A	150-F5NBD	150-F5NBR
25 A	25 A	25 A	25 A	150-F25NBD	150-F25NBR
43 A	43 A	42 A	31 A	150-F43NBD	150-F43NBR
60 A	60 A	51 A	36 A	150-F60NBD	150-F60NBR
85 A	85 A	71 A	51 A	150-F85NBD	150-F85NBR
108 A	108 A	94 A	71 A	150-F108NBD	150-F108NBR
135 A	116 A	94 A	71 A	150-F135NBD	150-F135NBR
201 A	201 A	182 A	141 A	150-F201NBD	150-F201NBR
251 A	222 A	182 A	141 A	150-F251NBD	150-F251NBR
317 A	311 A	256 A	202 A	150-F317NBD	150-F317NBR
361 A	311 A	256 A	202 A	150-F361NBD	150-F361NBR
480 A	433 A	356 A	278 A	150-F480NBD	150-F480NBR
625 A	625 A	607 A	501 A	150-F625NBA ¹⁾	-
780 A	719 A	607 A	501 A	150-F780NBA ¹⁾	-
970 A	851 A	709 A	571 A	150-F970NBA ¹⁾	-
1250 A	1039 A	859 A	680 A	150-F1250NBA ¹⁾	-



8 A	8 A	8 A	8 A	150-F5NBD	150-F5NBR
43 A	43 A	43 A	43 A	150-F25NBD	150-F25NBR
74 A	74 A	72 A	53 A	150-F43NBD	150-F43NBR
103 A	103 A	88 A	62 A	150-F60NBD	150-F60NBR
147 A	147 A	123 A	88 A	150-F85NBD	150-F85NBR
187 A	187 A	163 A	123 A	150-F108NBD	150-F108NBR
233 A	201 A	163 A	123 A	150-F135NBD	150-F135NBR
347 A	347 A	314 A	243 A	150-F201NBD	150-F201NBR
434 A	385 A	314 A	243 A	150-F251NBD	150-F251NBR
548 A	539 A	443 A	350 A	150-F317NBD	150-F317NBR
624 A	539 A	443 A	350 A	150-F361NBD	150-F361NBR
830 A	749 A	616 A	482 A	150-F480NBD	150-F480NBR
850 A	850 A	850 A	850 A	150-F625NBA ¹⁾	-
900 A	900 A	900 A	866 A	150-F780NBA ¹⁾	-
1200 A	1200 A	1200 A	988 A	150-F970NBA ¹⁾	-
1600 A	1600 A	1486 A	1177 A	150-F1250NBA ¹⁾	-

Notes:

¹⁾ Control voltage 230/240 V AC.



Allen-Bradley SMC-Flex Accessories

Human Interface Modules (HIM)	Cat. No.
Hand-held HIM (full numeric keypad)	20-HIM-A3 ¹⁾

Communication Modules	Cat. No.
EtherNet/IP	20-COMM-E
DeviceNet	20-COMM-D
Profibus	20-COMM-P
ControlNet (Coax)	20-COMM-C
ControlNet (Fibre)	20-COMM-Q

Terminal Covers (package quantity of one) ²⁾	Cat. No.
To suit 150-F-108...135	150-TC1
To suit 150-F-201...251	150-TC2
To suit 150-F-317...480	150-TC3

SMC-Flex dimensions (mm) and weight (kg)

Cat. No.	Width	Height	Depth	kg
150-F5...85	150.0	321.0	230.0	5.7
150-F108...135	196.4	443.7	212.2	15.0
150-F201...251	225.0	560.0	253.8	30.4
150-F317...480	290.0	600.0	276.5	45.8
150-F625...780	596.9	1041.1	346.2	179
150-F970...1250	596.9	1041.1	346.2	224

Notes:

- ¹⁾ In addition, a 20-HIM-H10 cable is required to connect the HIM to the SMC-Flex.
- ²⁾ 150-F5...85 units have terminal guards as standard. No additional terminal guards are required.

Enclosed soft starter solutions

NHP can manufacture enclosed Allen-Bradley SMC-3 and SMC-Flex soft starters to your specifications. Please contact NHP for further information.



Also available, Allen Bradley SMC-50

The new Allen-Bradley SMC-50 soft starters (90...520 A) are also available and are particularly suited to mining and industry applications. The SMC-50 includes sensor-less linear acceleration and deceleration, torque control starting mode, expandable I/O as well as advanced motor control, protection and communications. For further information consult NHP.





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