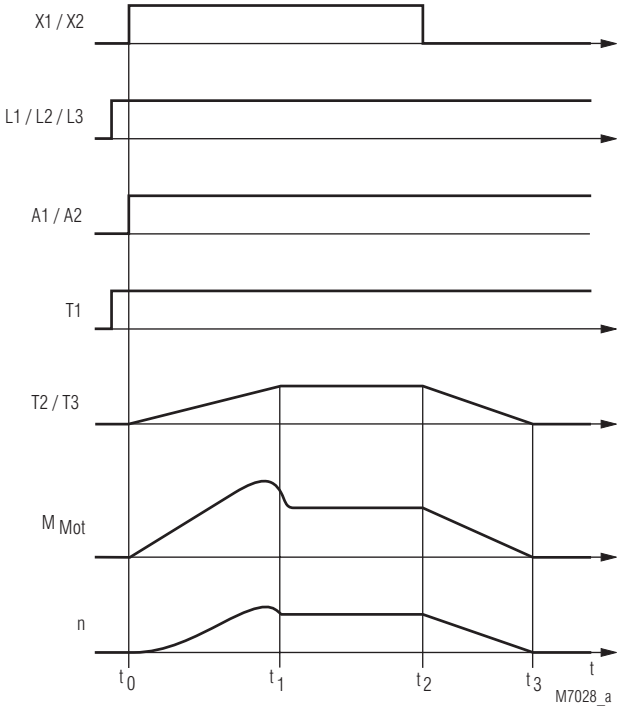
MINISTART
Softstarter With Softstop
BA 9019

0223495

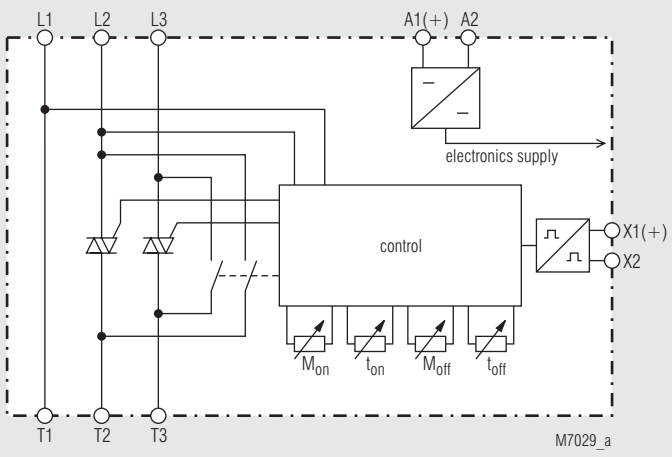
- According to IEC/EN 60 947-4-2
- Softstart and softstop function
- 2-phase motor control
- For motors up to 5.5 kW
- Adjustable ramp time, starting torque and deceleration time
- Wide motor voltage range
- Galvanic separation of control input
- Galvanic separation of auxiliary power supply
- Integrated overtemperature monitoring
- Width: 45 mm

Function Diagram



t_0 : start
t_0-t_1 : ramp up time
t_2-t_3 : ramp down time

Block Diagram



Approvals and Markings

CE
C SA US
Canada / USA
* see variant

Applications

- Motors with gear, belt or chain drive
- Fans, pumps, conveyor systems, compressors
- Woodworking machines, centrifuges
- Packaging machines, door drives
- Start current limiting on 3 phase motors

Function

Softstarters are electronic devices designed to enable 3-phase induction motors to start smoothly. The BA 9019 slowly ramps up the current on two phases, therefore allowing the motor torque to build up slowly. This reduces the mechanical stress on the machine and prevents damage to conveyed material.
When the motor is up to full speed the semiconcutors in BA 9019 are bridged to prevent internal power losses and heat build up. In addition BA 9019 allows a softstop function prolonging the stop time of the motor, preventing high counter torques from abruptly stopping the motor.

Indication

LED green:	on, when power connected
LED yellow:	on, when power semiconductors bridged
LED red:	on, when temperature monitoring active
BA 9019/100	
LED green:	on, when auxiliary supply connected
LED yellow:	flashing, during ramp up or down continuously on, when power semiconductors bridged

Notes

Motor load must always be connected as continuous operation of the softstart with no load may cause overheating of the motor and softstart.
It is recommended that the softstart is protected by superfast semiconductor fuses rated as per the current rating of the softstart or motor. However, standard line and motor protection is acceptable, but for high starting frequencies motor winding temperature monitoring is recommended.

Technical Data

Nominal voltage L1/L2/L3:	3 AC 200 V -10% ... 460 V +10%	
Nominal frequency:	50 / 60Hz	
Nominal motor power P_N at		
400 V:	3 kW	5.5 kW
200 V:	1.5 kW	2.2 kW
Rated current:	8 A	12 A
Switching frequency		
up 3 x I_N, 5 s, ϑ_U = 20 °C:	20 / h	10 / h
Min. motor power:	approx. 10 % of rated motor power	
Start torque:	50 ... 80 %	
Ramp time:	0.5 ... 5 s	
Deceleration torque:	30 ... 80 %	
Deceleration time:	0.5 ... 5 s	
Recovery time:	200 ms	
Auxiliary voltage A1 + / A2:	DC 24 V	± 20 %
Power consumption:	3 W	
Residual ripple:	5 %	

Control Input

Voltage range X1/X2:	DC: 0 ... 28.8 V	
Softstart:	> 13 V	
Softstop:	< 5 V	

General Data

Operating mode:	Continuous operation	
Temperature range:		
Operation:	0 ... + 55 °C	
Storage:	- 25 ... + 75 °C	
Relative air humidity:	93 % at 40 °C	
Altitude:	< 1,000 m	
Clearance and creepage distance		
Rated insulation voltage:	AC 500V	
Overvoltage category:	III	
Rated impuls voltage / pollution degree between auxiliary voltage/control circuit nominal voltage:	4 kV / 2	IEC/EN 60 664-1
EMC		
Interference resistance		
Electrostatic discharge (ESD):	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation		
80 Mhz ... 1.0 Ghz:	10 V / m	IEC/EN 61 000-4-3
1.0 GHz ... 2.5 GHz:	3 V / m	IEC/EN 61 000-4-3
2.5 GHz ... 2.7 GHz:	1 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltage between		
wires for power supply:	1 kV	IEC/EN 61 000-4-5
between wire and ground:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Voltage dips		IEC/EN 61 000-4-11
Interference emission		
Wire guided:	Limit value class A*)	IEC/EN 60 947-4-2
	*) The device is designed for the usage under industrial conditions (Class A, EN 55011). When connected to a low voltage public system (Class B, EN 55011) radio interference can be generated. To avoid this, appropriate measures have to be taken.	
Radio irradiation:	Limit value class B	IEC/EN 60 947-4-2
Degree of protection:		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz,	IEC/EN 60 068-1
Climate resistance:	0 / 055 / 04	IEC/EN 60 068-1
Wire connection:	2 x 2.5 mm² solid or 1 x 1.5 mm² stranded wire with sleeve DIN 46 228-1/-2/-3/-4	
Stripping length:	10 mm	
Fixing torque:	0.8 Nm	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Mounting:	DIN rail	
Weight:	300 g	

Dimensions

Width x height x depth:	45 x 74 x 121 mm

Standard Type

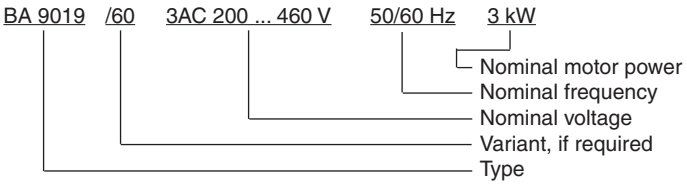
BA 9019 3 AC 200 ... 460 V 50/60 Hz 3 kW

Article number:	0051284
• Nominal voltage:	3 AC 200 ... 460 V
• Nominal motor power:	3 kW
• Width:	45 mm

Variant

BA 9019/60:	with CSA-approval for 3 AC 200 V - 10 % ... 400 V + 10 % 10 A nominal current
BA 9019/100:	eceleration time from 0 ... 5 s adjustable

Ordering example for variant



Installation

This units must be mounted on a vertical mounting area with the connections in a vertical plane, i.e. top to bottom.
Ensure that no external heat source is placed below the unit and a 40 mm air gap is maintained above and below. Other devices may be directly mounted either side of the unit.

Control Input

If a voltage of more than 13 V DC is connected to terminals X1/X2, the device begins with softstart. If the voltage falls lower than DC 5 V the device will softstop.

Adjustment Facilities

Potentiometer	Description	Initial setting
M_{on}	Starting voltage	fully anti-clockwise
t_{on}	Ramp-up time	fully clockwise
M_{off}	Deceleration voltage	fully clockwise
t_{off}	Deceleration time	fully clockwise

Set-up Procedure

Set potentiometer "M_{an}" to minimum (fully anti-clockwise).
Set potentiometer "M_{ab}" to maximum (fully clockwise).
Set potentiometer "t_{an}" to maximum (fully clockwise).
Set potentiometer "t_{ab}" to maximum (fully clockwise).
Start the motor and turn potentiometer "M_{an}" up until the motor starts to turn without excessive humming.
Stop the motor and restart.
Adjust potentiometer "t_{an}" to give the desired ramp time.
Stop and restart the motor.
Adjust potentiometer "M_{ab}" until the motor starts to visibly slow down at the initation of the softstop cycle.
Stop and restart the motor.
Adjust potentiometer "t_{ab}" to give the desired deceleration time.
Stop and restart the motor, readjusting the potentiometers until the desired starting/stopping characteristics are achieved.

- **Attention:** If the ramp-up time is adjusted to short, the internal bridging contact closes before the motor is on full speed. This may damage the bridging contactor or bridging relay.

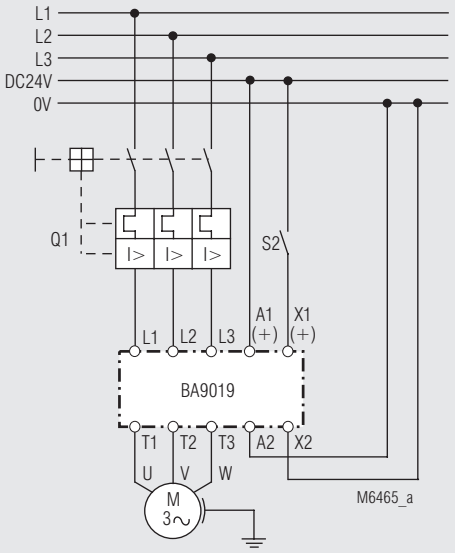
Temperature Monitoring

BA 9019 features overtemperature monitoring of its internal power semiconductors. When the safe running temperature is exceeded the power semiconductors will turn off and a red LED on the front of the unit will illuminate. BA 9019 can be reset after the semiconductors have cooled down by momentarily removing the auxiliary supply voltage.

Safety Notes

- Never clear a fault when the device is switched on
- **Attention:** This device can be started by potential-free contact, while connected directly to the mains without contactor (see application example). Please note, that even if the motor is at rest, it is not physically separated from the mains. Because of this the motor **must** be disconnected from the mains via the corresponding manual motor starter.
- The user must ensure that the device and the necessary components are mounted and connected according to the locally applicable regulations and technical standards.
- Adjustments may only be carried out by qualified specialist staff and the applicable safety rules must be observed.

Application Example



Softstart and softstop