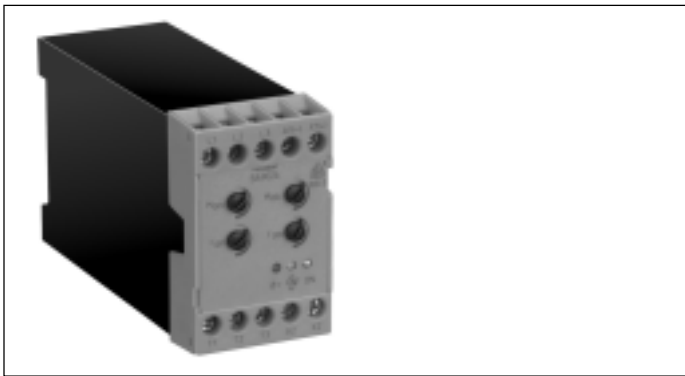


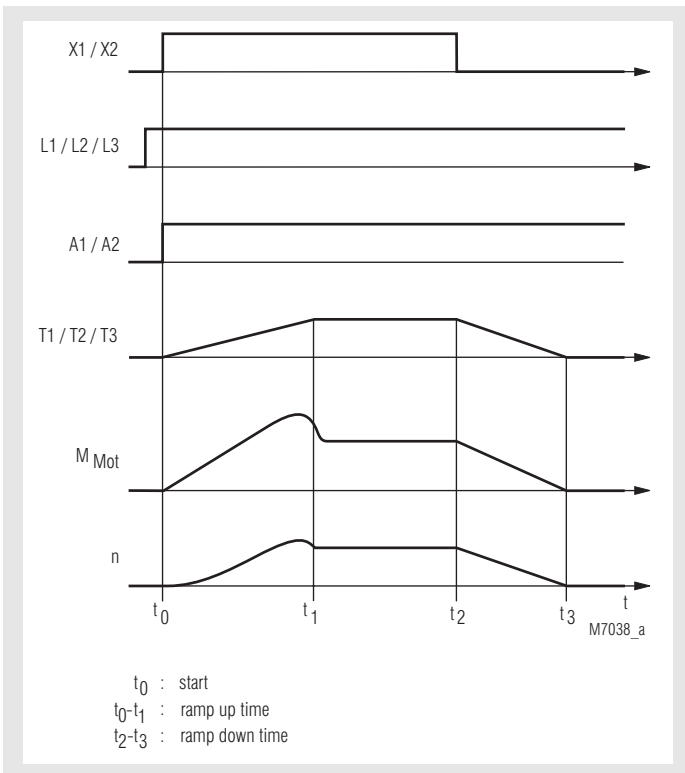
## Softstarter with softstop BA 9026 ministart

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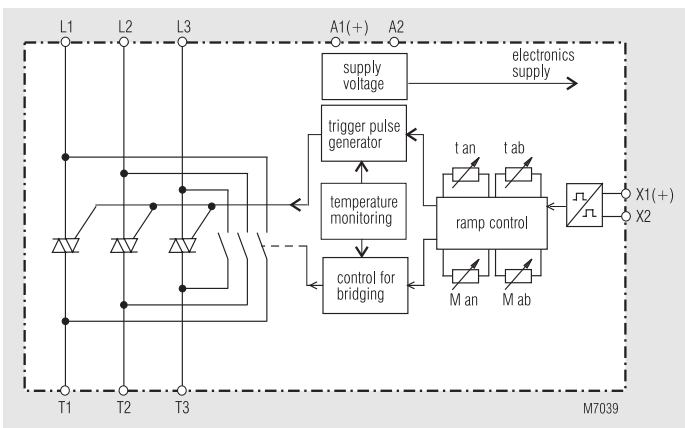


- Increases the life of squirrel cage motors and mechanical drives
- Easily fitted to existing installations
- 3-phase control softstart and softstop
- For motors up to 3 kW
- Start current limited to 2 to 3 times rated motor current
- Semiconductors bridged after softstart
- Adjustable ramp time, starting torque and deceleration time
- LED indication
- DIN rail mounted
- Galvanic isolation of control input and auxiliary power supply
- Integrated overtemperature monitoring
- Wide motor voltage range 200 to 460 V AC
- Width 45 mm

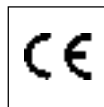
### Function diagram



### Block diagram



### Approvals and marking



### Applications

- Motor with gear, belt or chain drive
- Fans, pumps, conveyor systems, compressors
- Packaging machines, door-drives
- Start current limiting on 3-phase motors
- Reduces on off current on transformers and P.S.U's

### Function

Softstarts are electronic devices designed to enable 1-phase or 3-phase induction motors to start smoothly. The BA 9026 slowly ramps up the current on three 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 semiconductors in BA 9026 are bridged to prevent internal power losses and heat build up in addition BA 9026 allows a softstop function prolonging the stop time of the motor preventing high counter torques from abruptly stopping the motor.

### Indication

LED green	ON	= power connected
LED yellow	ON	= power semiconductors bridged
LED red	ON	= overtemperature

### Principle of operation

For direct on line or star delta applications, terminals L1, L2, L3 are connected to the mains contactor, with the motor connected to terminals T1, T2, T3. A 24 V DC auxiliary supply is connected to terminals A1, A2 and a 24 V DC control signal connected to terminals X1-X2.

When power is connected to terminals L1, L2, L3 and 24 V DC is present at terminals X1-X2, the softstart will commence. Potentiometer " $t_{an}$ " (0,5-5s) adjust the ramp time (time motor takes to get to full speed) and potentiometer " $M_{an}$ " adjusts the start voltage (50-80 % nomV). When the softstart is complete the internal semiconductors are automatically bridged.

When 24 V DC is removed from terminals X1-X2, the softstop function will commence for the deceleration time period set on potentiometer " $t_{ab}$ " (0,5-5s) and deceleration voltage level set on potentiometer " $M_{ab}$ " (30-80 % nomV).

### 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 of motor. However, standard line and motor protection is acceptable, but for high starting frequencies motor winding temperature monitoring is recommended.

## Technical data

<b>Nominal voltage:</b>	AC 200 V -10% ... 460 V +10%
<b>Nominal frequency:</b>	50 / 60Hz
<b>Rated current:</b>	8 A
<b>Nominal motor power P<sub>N</sub> at 400 V:</b>	3 kW
<b>200 V:</b>	1,5 kW
<b>Min. motor power:</b>	approx. 10 % of rated motor power
<b>Start torque:</b>	50 ... 80 %
<b>Ramp time:</b>	0,5 ... 5 s
<b>Deceleration time:</b>	0,5 ... 5 s
<b>Recovery time:</b>	200 ms
<b>Switching frequency:</b>	20 / h (3 x I <sub>r</sub> , t <sub>acc</sub> = 5 s, J <sub>v</sub> = 20 °)
<b>Auxiliary voltage A1/A2:</b>	DC 24 V ± 20 %
<b>Power consumption:</b>	3 W
<b>Residual ripple:</b>	5 %

## Control input

<b>Voltage range X1+/X2:</b>	DC: 0 ... 28,8 V
<b>Softstart:</b>	> 13 V
<b>Softstop:</b>	< 5 V

## General data

<b>Temperature range:</b>	0 ... + 55°C
<b>Storage temperature:</b>	-25 ... + 75°C
<b>Testing voltage:</b>	2,5 kV
<b>Degree of protection:</b>	Housing: IP 40 IEC/EN 60 529 Terminals: IP 20 IEC/EN 60 529
<b>Climate resistance:</b>	0 / 055 / 04 IEC/EN 60 068-1
<b>Wire connection:</b>	up to 2,5 mm <sup>2</sup> stranded ferruled
<b>Mounting:</b>	DIN-rail mounting
<b>Weight:</b>	300 g

## Dimensions

<b>Width x height x depth:</b>	45 x 74 x 121 mm
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## Standard type

BA 9026	3 AC 200 ... 460 V	50/60 Hz	3 kW	
Article number:		0046450		stock item
• Nominal voltage:	3 AC 200 ... 460 V			
• Nominal motor power:	3 kW			
• Width:	45 mm			

## Ordering example

BA 9026	3AC 200 ... 460 V	50/60 Hz	3 kW	
				Nominal frequency
				Nominal motor power
				Nominal voltage
				Type

## 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 below 5 V DC the device will softstop.

## Setup procedure

Set potentiometer "M<sub>an</sub>" to minimum (fully anti-clockwise).  
Set potentiometer "M<sub>ap</sub>" to maximum (fully clockwise).  
Set potentiometer "t<sub>an</sub>" to maximum (fully clockwise).  
Set potentiometer "t<sub>ab</sub>" to maximum (fully clockwise).  
Start the motor and turn potentiometer "M<sub>an</sub>" up until the motor starts to turn without excessive humming.  
Stop the motor and restart.  
Adjust potentiometer "t<sub>an</sub>" to give the desired ramp time.  
Stop and restart the motor.  
Adjust potentiometer "M<sub>ab</sub>" until the motor starts to visibly slow down at the initiation of the softstop cycle.  
Stop and restart the motor.  
Adjust potentiometer "t<sub>ab</sub>" 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.

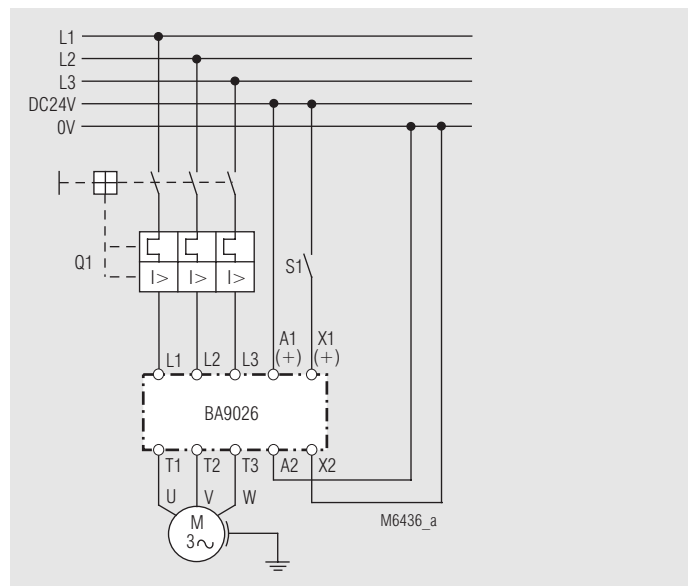
## Temperature monitoring

BA 9026 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 9026 can be reset after the semiconductors have cooled down by momentarily removing the auxiliary supply voltage.

## Safety instructions

- 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.

## Connection example



Softstart and softstop