MINISTART
Softstarter With Softstop
BA 9026

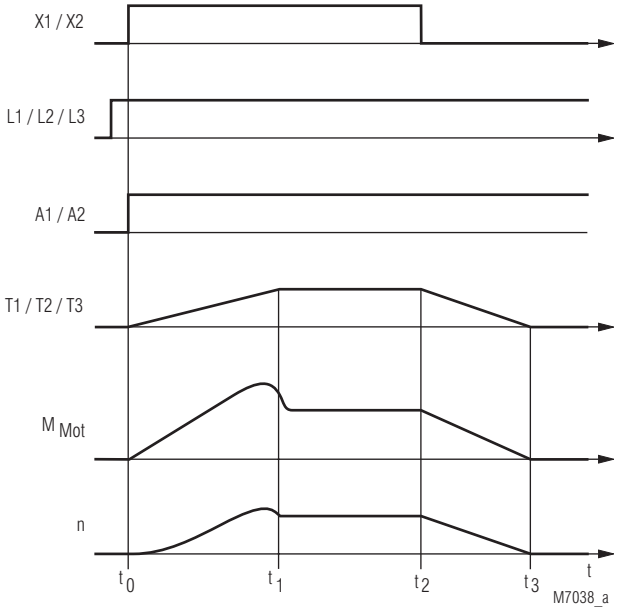
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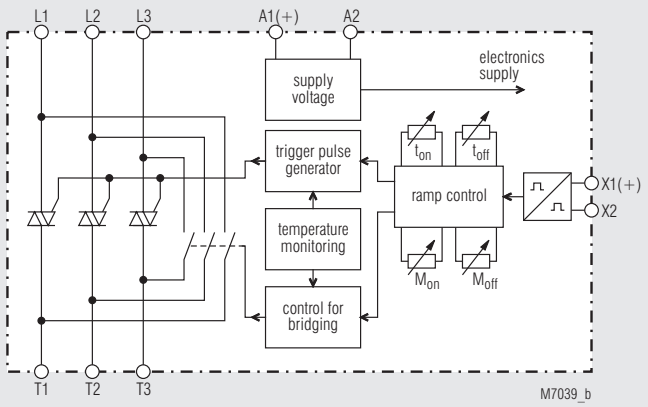
- According to IEC/EN 60 947-4-2
- Softstart and softstop function
- 3-phase motor control
- For motors up to 5.5 kW
- Adjustable ramp time, starting torque and deceleration time
- Wide motor voltage range
- Galvanic separation of control input
- Galvanic separation of auxiliary power supply
- Integrated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

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

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 or 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 to 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 24V DC auxiliary supply is connected to terminals A1, A2 and a 24V DC control signal connected to terminals X1-X2.
When power is connected to terminals L1, L2, L3 and 24V DC is presentat terminals X1-X2, the softstart will commence. Potentiometer"t_{an}" (0.5 - 5 s) adjusts 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 auto-matically bridged. When 24 V DC is removed from terminals X1-X2, the softstop function willcommence for the deceleration time period set on potentiometer"t_{ab}" (0.5 - 5 s) 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 recomended 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.

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.

Technical Data

Nominal voltage:	AC 200 ... 460 V	
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:		
3 x I_r, t_{acc} = 5 s, J_v = 20 °	20/h	10/h
Min. motor power:	approx. 10 % of rated motor power	
Start torque:	50 ... 80 %	
Ramp time:	0.5 ... 5 s	
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 B	IEC/EN 60 947-4-2
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 9026 3 AC 200 ... 460 V 50/60 Hz 3 kW

Article number:	0046450
• Nominal voltage:	3 AC 200 V
• Nominal motor power:	3 kW
• Width:	45 mm

Variant

Ordering example for variant

BA 9026 3 AC 200 ... 460 V 50/60 Hz 3 kW

- Nominal motor power
- Nominal frequency
- Nominal voltage
- Type

Installation

This units must be mounted on a vertical mounting are a 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.

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 toturn 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 atthe initiation 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.

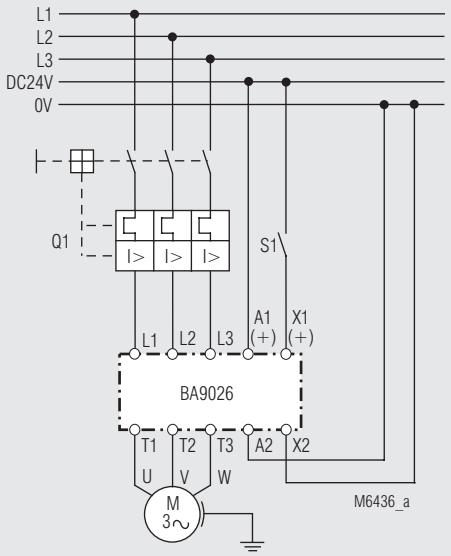
Temperature Monitoring

BA 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 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 componentsare mounted and connected according to the locally applicableregulations 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