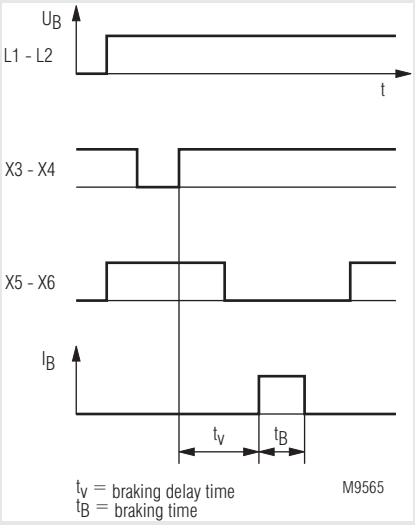
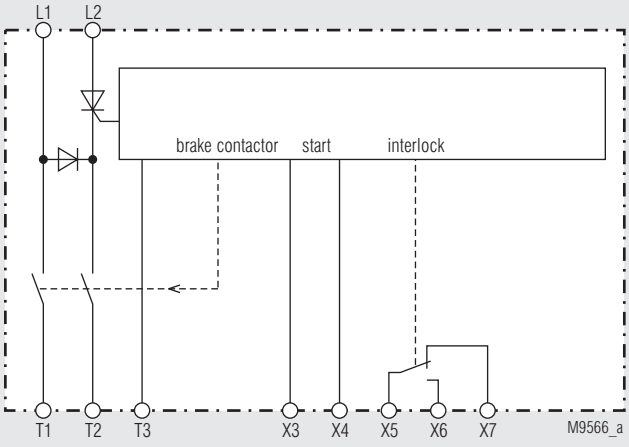
# MINISTOP
# Motor Brake Relay
# BA 9034N

0256981


## Function Diagram




## Block Diagram




**Your advantages**
- Higher safety level and more economic by short stopping cycle
- Cost saving
- Compact design
- Easily appliance, no need for current measuring instrument

**Features**
- According to IEC/EN 60947-4-2
- For all single and 3-phase asynchronous motors
- DC-brake with one way rectification up to max. 32 $A_{eff}$
- Controlled by microcontroller
- Easily fitted to existing installations
- Wear free and maintenance free
- Integrated braking contactor
- DIN-rail mounting
- Adjustable braking current (controlled current)
- With automatic standstill detection
- Variante /100
  - with braking time control
  - without detection of standstill
- Width: 45 mm

## Approvals and Markings

CE

## Applications

- Saws
- Centrifuges
- Woodworking machines
- Textile machines
- Conveyors

## Function

The supply voltage is connected to terminals L1-L2 and the interlock contact X5-X6 closes to enable the motor contactor. A green LED indicates operation. The motor can be started with the start button.
The braking DC-voltage is generated on terminals $T_1$ and $T_2$.
The braking sequence is as follows:
Pressing the stop button de-energises the motor contactor. The closing of X3-X4 (contact of the motor contactor) starts the braking. After a safety time the braking contactor closes for the adjusted braking time and the braking current flows through the motor.

## Notes

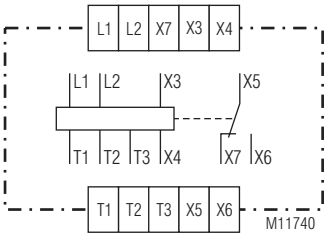
Terminal 3 is the measuring input for standstill detection.
The BA 9034N can be also used without connecting T3. Standstill will be detected by the current measuring. It is important to make sure, that the braking current will flow longer than 2 s before stopping the motor. If the motor stops to early, the standstill will not be detected on the braking current will flow for the maximum braking time.

To have an optimal standstill detection make sure that the braking current is greater than the nominal current of the motor.

If the back-EMF of the motor drops only slowly the unit may have a braking delay of up to 2 s.

On variant /100 the braking current flows for the adjusted time $t_B$.

## Circuit Diagram




## Connection Terminals

| Terminal designation | Signal designation |
|---|---|
| X3 | Start braking, NC contact |
| X4 | Start braking, NC contact |
| X5, X6 | Interlock for monitor contactor |
| X5, X7 | Star-contactor control |
| L1 | Phase voltage L1 |
| L2 | Phase voltage L2 |
| T1 | Motor connection T1 |
| T2 | Motor connection T2 |
| T3 | Motor connection T3 (detection of standstill) |

## Indicators

| | | |
|---|---|---|
| LED green „RUN“: | - ready: | permanent on |
| LED red „Error“ | - Mains frequency out of tolerance | flashes 1 times |
| | - Braking current is not present: | flashes 2 times |
| | - Power semiconductors overheated: | flashes 3 times |
| | - Synchronisation signal is not present: | flashes 4 times |
| | - Temperature measuring circuit defective: | flashes 5 times |
| | - Motor voltage not disconnected: | flashes 6 times |
| LED yellow „$I_B$“ | - max. braking time 11 s Braking current is present | permanent on |
| | - max. braking time 31 s Braking current is present | flashes |

## Technical Data

| | | |
|---|---|---|
| **Nominal Voltage $U_N$:** | AC 230 V ± 10 %, AC 400 V ± 10 % | |
| **Nominal frequency:** | 50/60 Hz ± 3 Hz | |
| **Permissing braking current:** | 2 ... 10 $A_{eff}$ , 5 ... 25 $A_{eff}$ , 5 ... 32 $A_{eff}$ | |
| **Duty-cycle at max. braking current:** | 8 % | |
| **Braking voltage:** | DC 10 ... 190 V | |
| **Max. braking time:** | 11 s | |
| **Braking delay for fade out of back EMF:** | auto optimising (0.2 ... 2 s) | |
| **Nominal consumption for control circuit:** | 5 VA | |
| **Short circuit strength max. fuse rating** | | |
| **Line protection:** | 20 A gG / gL | IEC/EN 60 947-5-1 |
| **Assignment type:** | 1 | IEC/EN 60 947-4-1 |
| **Semiconductor fuse:** | max. 1200 $A^2s$ Typ gR | |
| **Assignment type:** | 2 | IEC/EN 60 947-4-1 |

### Output

| | | |
|---|---|---|
| **Contacts:** | 1 changeover contact 5 A / AC 250 V | |
| **Switching capacity** to AC 15: | | |
| NO contact: | 5 A / AC 230 V | IEC/EN 60 947-5-1 |
| NC contact: | 2 A / AC 230 V | IEC/EN 60 947-5-1 |
| **Electrical life**: | 1 x $10^5$ switching cycles | |
| **Mechanical life:** | 50 x $10^6$ switching cycles | |

### General Data

| | | |
|---|---|---|
| **Operating mode:** | Continuous operation | |
| **Temperature range:** | | |
| Operation: | 0°C ... + 45°C | |
| Storage: | - 25°C ... + 75°C | |
| **Relative air humidity:** | 93 % at 45°C | |
| **Altitude:** | < 2,000 m | |
| **Clearance and creepage distance** | | |
| Rated impulse voltage / pollution degree | | |
| Relay contacts to supply voltage: | 4 kV / 2 | IEC 60 664-1 |
| Overvoltage category: | III | |
| **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 | | |
| 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 |
| **Irradiation** | | |
| Interference suppression: | Limit value class B | EN 55 011 |
| **Degree of protection** | | |
| Housing: | IP 40 | IEC/EN 60 529 |
| Terminals: | IP 20 | IEC/EN 60 529 |
| **Housing:** | Thermoplastic with V0 behaviour according to UL subject 94 | |
| **Vibration resistance:** | Amplitude 0.35 mm, Frequency 10 ... 55 Hz, | IEC/EN 60 068-2-6 |
| **Climate resistance:** | 25 / 075 / 04 | IEC/EN 60 068-1 |
| **Terminal designation:** | EN 50 005 | |
| **Wire connection:** | | |
| Cross section: | 2 x 2,5 $mm^2$ solid or 1 x 1,5 $mm^2$ stranded ferruled DIN 46 228-1/-2/-3/-4 | |
| Stripping length: | 10 mm | |
| **Wire fixing:** | Flat terminals with self-lifting clamping piece | IEC/EN 60 999-1 |
| **Fixing torque:** | 0.8 Nm | |
| **Mounting:** | DIN rail | IEC/EN 60 715 |
| **Weight:** | 600 g | |

### Dimensions

| | |
|---|---|
| **Width x height x depth:** | 45 x 73 x 122 mm |

## Standard Type

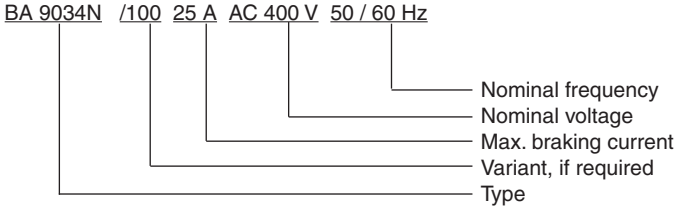
BA 9034N 25 A AC 400 V 50 / 60 Hz 2 ... 11 s
Article number: 0061337

- Integrated braking contactor
- DIN-rail mounting
- Width: 45 mm

## Variant

BA 9034N/100: without standstill monitoring and with potentiometer for setting of braking delay time up to 15 s

**Ordering example for variant**




## Control Input

If the connection between X3-X4 is opened, the device turns into standby mode. After closing the connection, the device starts with braking.
The device can be started also without control on X3-X4. In this case the braking delay is slightly longer up to 1.5 s.

## Monitoring Output

X5, X6: Interlock contact for motor contactor. This contact will be open at system error, this means that the motor cannot be started!

X5, X7: Activation of the star contactor in a star-delta circuit during braking

## Adjustment Facilities

| Potentiometer | Description | Initial setting |
|---|---|---|
| $I_B$ | Braking current | Fully anti-clockwise |

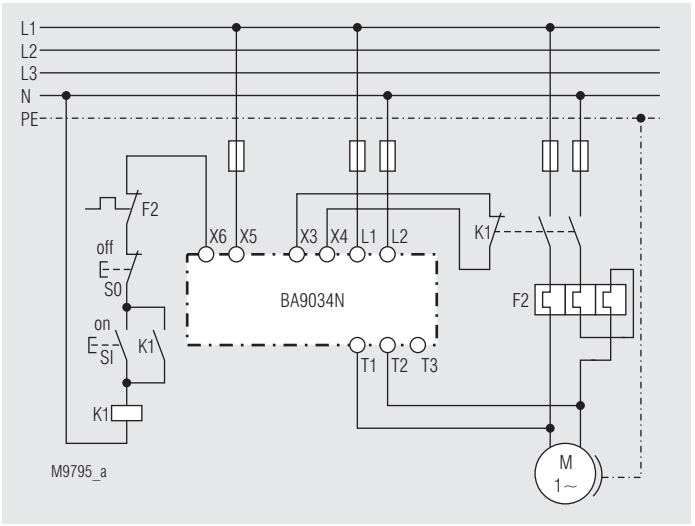
Variant /100:

| Potentiometer | Description | Initial setting |
|---|---|---|
| $T_B$ | Braking delay time | Fully clockwise |

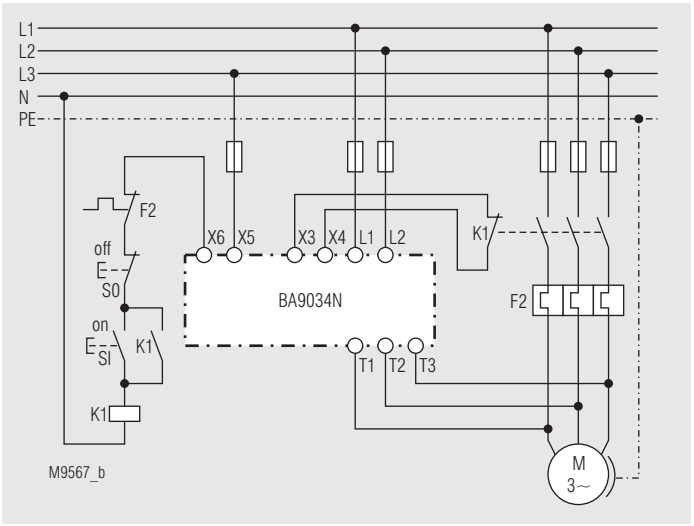
The braking current is controlled according to the adjusted value in Ampere.

For optimum braking the setting of the current should be max. 1.8 to 2 times the motor current. This corresponds to the saturation current of the magnetic field used to brake the motor. A higher current only overheats the motor. A higher braking efficiency can be obtained by using 2 or more stator windings. The permitted duty cycle is depending on the actual braking current and the ambient temperature.

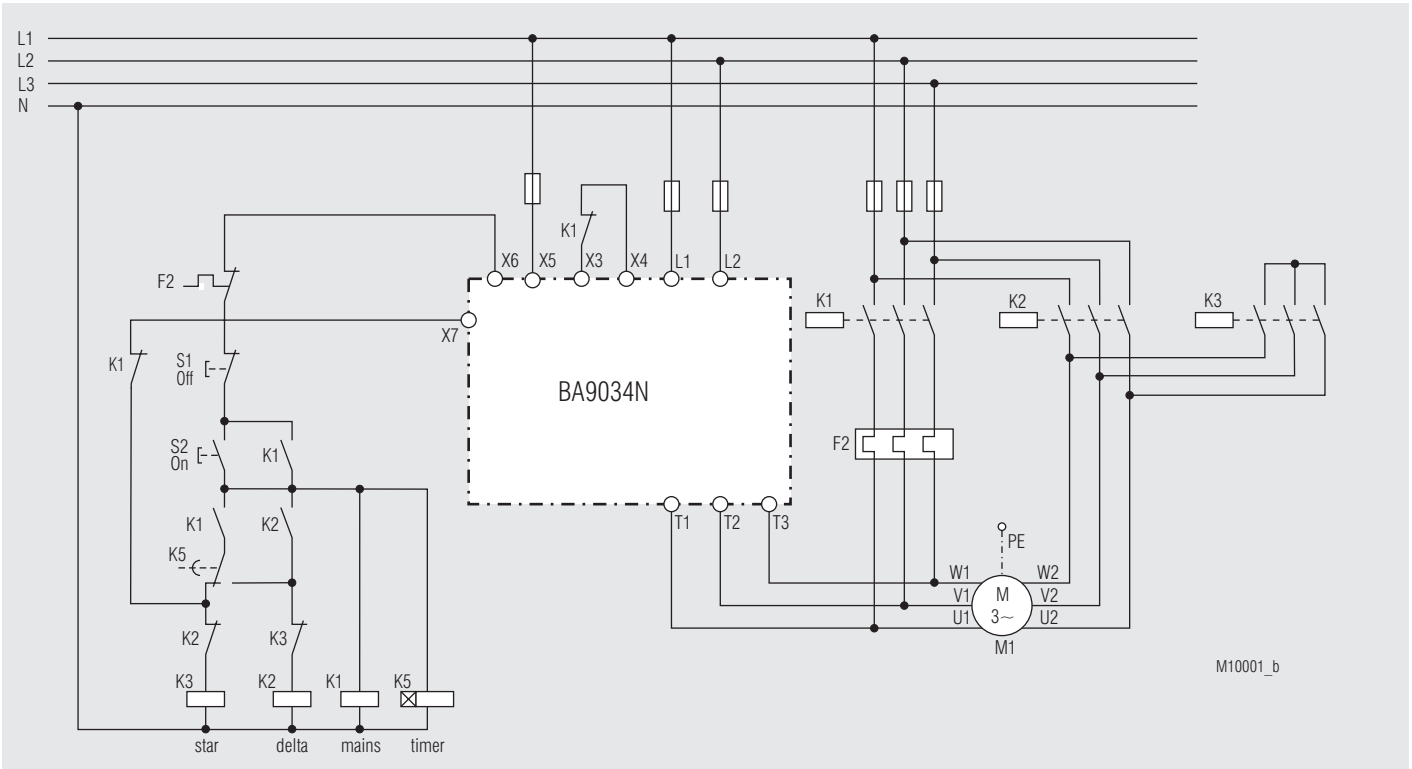
## Connection Examples




BA 9034N, single-phase

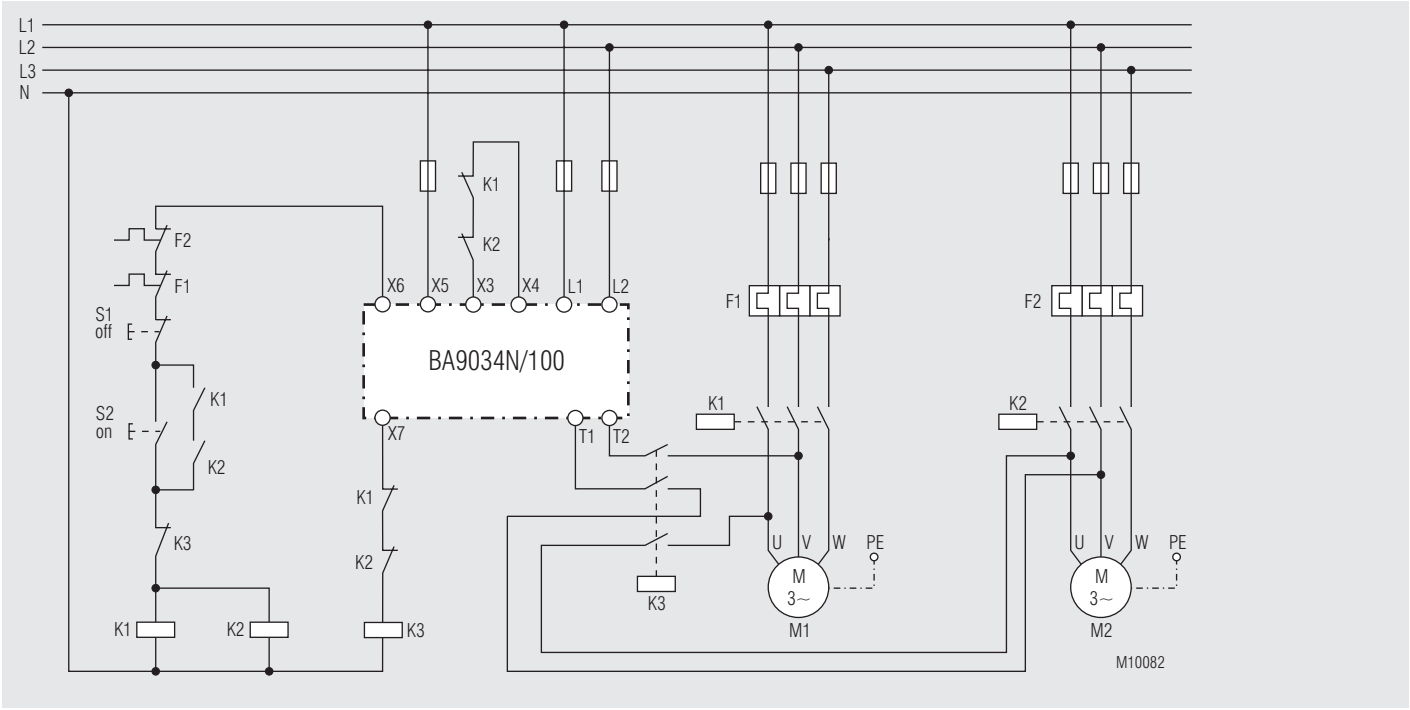



BA 9034N, 3-phase

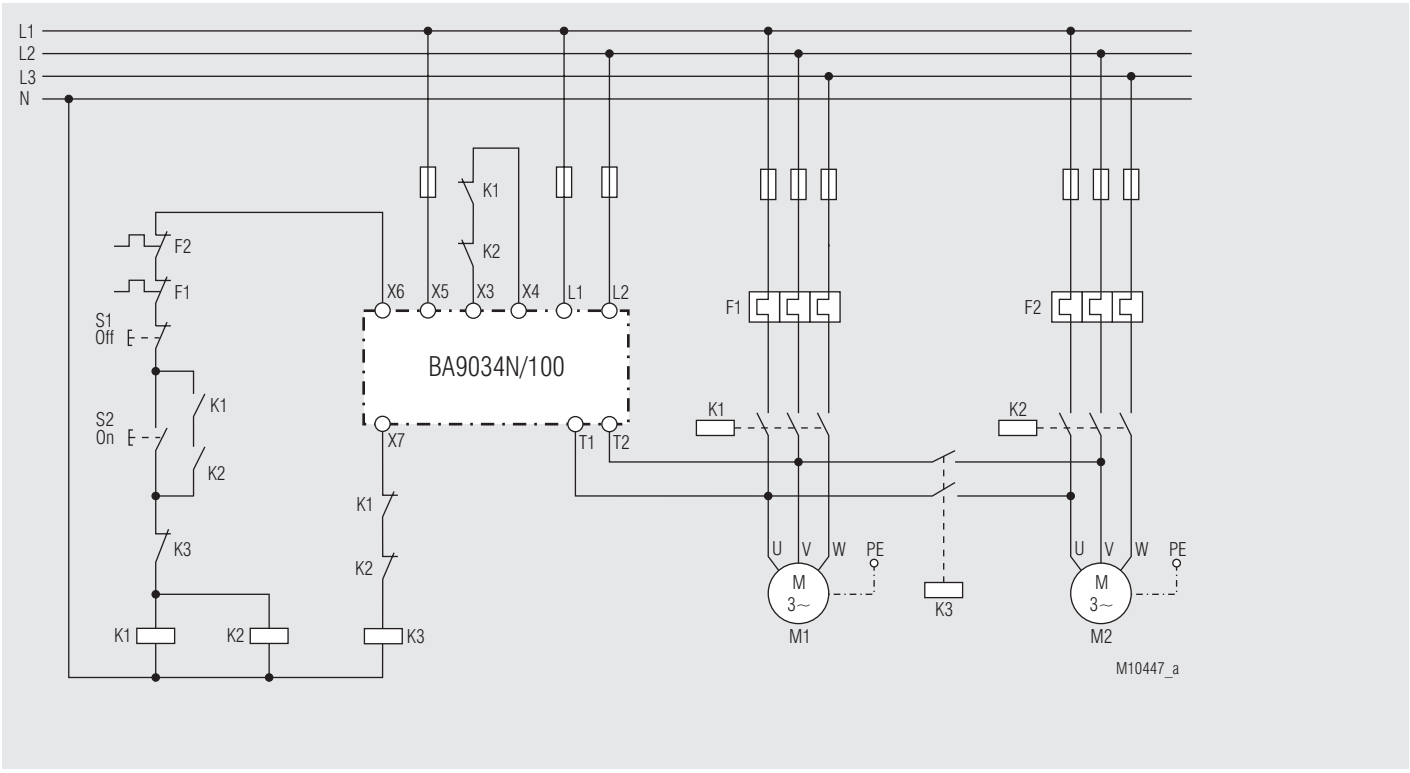



BA 9034N, 3-phase, ⅄-start up

## Connection Example




BA 9034N/100 simultaneous braking of 2 motors in serial connection for higher motor loads




BA 9034N/100 simultaneous braking of 2 motors in parallel connection for lower motor loads

## Set-up Procedure

- Connect the motor braking relay BA 9034N in accordance to the connection example and make sure to connect the same phases between (L1, L2) and /T1, T2). Make sure that the interlocking contact X5, X6 is wired in series to the coil of the motor contactor so that the motor contactor cannot switch on, while the braking current is flowing

- Set the braking current in the potentiometer scale.
  To avoid overloading of the motor set the current to max. two times the nominal motor current

- The braking time of the BA 9034N cannot be adjusted. Due to the standstill detection it is self-optimizing. If L3 is not connected to T3 standstill detection is provided by measuring the braking current.

- If no standstill is detected, the BA 9034N stops braking after 10 s

## Fault Indication by Flashing Code

During normal operation failure messages may occur. The messages are indicated by a flashing sequence of the „Error“ LED

| Flashes | Fault | Reason | Failure recovery |
|---|---|---|---|
| 1 x | Mains frequency out of tolerance | Wrong mains frequency | Device not suitable for the frequency. Contact manufacturer |
| 2 x | Breaking current is not present | Braking current circuit broken<br>Motor coil resistance is too high | Check the wiring<br>Set braking current lower until the error disappears |
| 3 x | Power semiconductors overheated | Permitted duty cycle exceeded | Decrease current and set the braking time longer. Wait till heat sink cools down |
| 4 x | Synchronisations signal is not present | Unit defective<br>or temporary interruption of power supply | The unit has to repaired<br>Switch unit Off and On |
| 5 x | Temperature measuring circuit defective | Unit defective<br>or overtemperature on power semiconductors while switching on | The unit has to repaired<br>Wait till heat sink cools down |
| 6 x | Motor is still connected to voltage while braking should start already | Motor contactor welded<br>Wiring incorrect | Change motor contactor<br>Check wiring |
| 7 x | Braking relay is welded | Unit defective | The unit has to repaired |