

CONTROL OF MECHANICAL BRAKES WITH NORDAC FLEX



The components of a drive system can be divided into the gear unit, the electric motor and the frequency inverter. If the motor is equipped with a mechanical brake, control can be performed directly via the frequency inverter. This is also known as brake management.

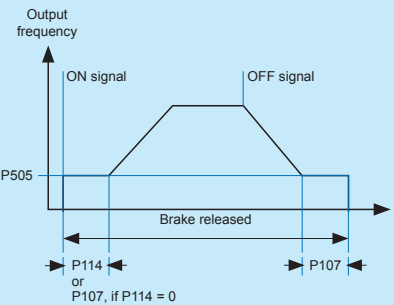
Function description

In principle, management of the mechanical motor brake can be carried out autonomously via the frequency inverter. The delayed response time of the electromagnetic brake can be taken into account with the parameter for the brake release time P114 and the parameter for time for applying the brake P107. Magnetisation of the motor and the flow of current to the brake coil starts with the enabling of the frequency inverter. The frequency inverter provides a rotating field with the absolute minimum frequency which is set in P505.

As soon as the brake release time from parameter P114 (from P107 of P114 = 0 sec) has elapsed, the motor is accelerated with

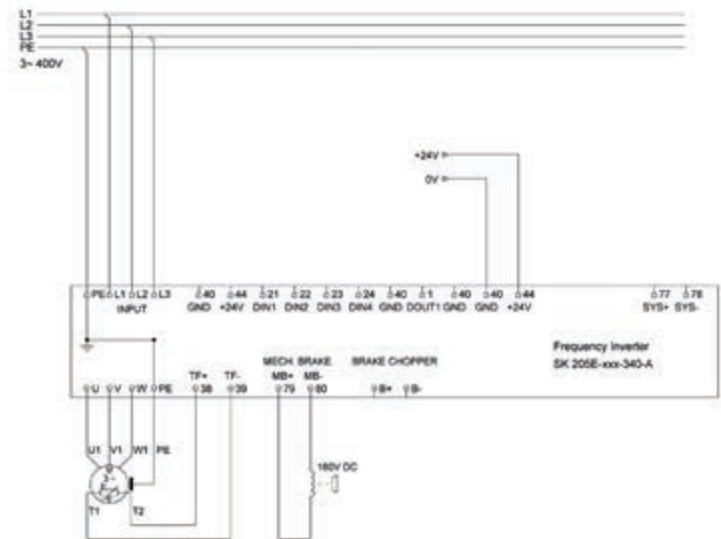
the acceleration ramp from the frequency setpoint. Analogously, when enabling is removed, the inverter reduces to the absolute minimum frequency according to the set brake ramp. This remains constant until the parameterised time for the application of the brake in P107 has elapsed and the output stage of the inverter is switched off.

If the inverter is controlled via a bus system, the mechanical brake is only released if a setpoint frequency > P505 is specified. Analogously, the brake is only applied if a setpoint frequency < P505 is present.



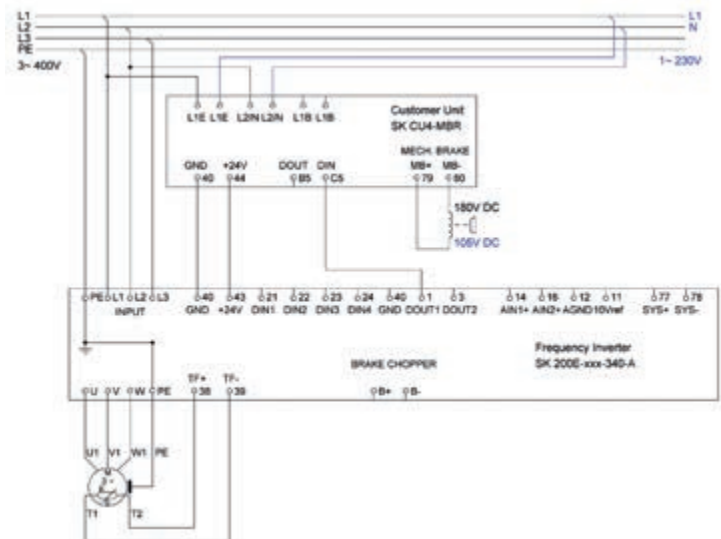
SK 205E Series

A complete brake rectifier is integrated into the inverter series SK 2x5E. The mechanical brake can therefore be connected directly to the terminals 79 and 80 which are provided.



SK 200E Series + SK CU4-MBR

SK 2x0E inverter versions (with the exception of Size 4) are not equipped with an integrated brake rectifier. For these devices there is the possibility of upgrading them with a suitable brake rectifier by means of the internal module SK CU4-MBR. Depending on the supply voltage and the wiring, the SK CU4-MBR module can be operated as a half-wave or a bridge rectifier. The brake rectifier is controlled via a digital output of the frequency inverter.



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Selection of the correct brake

The assignment of the correct brake coil voltage depends on the supply voltage and the FI type. Depending on the rated voltage of the SK 205E, either a bridge rectifier or a half-wave rectifier is installed.

SK 205E: Assignment of mains voltage to the brake coil voltage

Mains voltage	Device name	Rectifier	Voltage of brake coil
1~ 115 V	SK 205E-xxx-112-O	Bridge rectifiers	105 V DC
1~ 230 V	SK 205E-xxx-123-A	Half-wave rectifier	105 V DC
3~ 230 V	SK 205E-xxx-323-A	Half-wave rectifier	105 V DC
3~ 400 V	SK 205E-xxx-340-A	Half-wave rectifier	180 V DC
3~ 460 V	SK 205E-xxx-340-A	Half-wave rectifier	205 V DC
3~ 480 V	SK 205E-xxx-340-A	Half-wave rectifier	205 V DC
3~ 500 V	SK 205E-xxx-340-A	Half-wave rectifier	225 V DC

Depending on the mains voltage and the resulting connection type, the SK CU4-MBR module provides the possibility of half-wave or bridge rectification. This enables the connection of brakes with various brake coil voltages.

SK CU4-MBR: Assignment of mains voltage to the brake coil voltage

Mains voltage	Connection	Rectifier	Voltage of brake coil
1~ 115 V	L1 → L1 _B , N → L2/N	Bridge rectifiers	105 V DC
1~ 230 V	L1 → L1 _E , N → L2/N	Half-wave rectifier	105 V DC
3~ 230 V	L1 → L1 _E , L2 → L2/N	Half-wave rectifier	105 V DC
3~ 400 V	L1 → L1 _E , L2 → L2/N	Half-wave rectifier	180 V DC
3~ 460 V	L1 → L1 _E , L2 → L2/N	Half-wave rectifier	205 V DC
3~ 480 V	L1 → L1 _E , L2 → L2/N	Half-wave rectifier	205 V DC
3~ 500 V	L1 → L1 _E , L2 → L2/N	Half-wave rectifier	225 V DC

General data: Brake Control

SK 205E: Connection terminals 79/80: I ≤ 500 mA, permissible cycle time: up to 150 Nm ≤ 1.0 s, up to 250 Nm ≤ 0.5 s

SK CU4-MBR: Connection terminals 79/80: I ≤ 500 mA, permissible cycle time: up to 100 Nm ≥ 0.5 s, up to 150 Nm ≥ 1.0 s

Parameter settings / Relevant parameters

Parameter	Meaning	Setting values
P107	Application time	Depending on brake type
P114	Release time	Depending on brake type
P434 [1] (200E with SK CU4-MBR only)	Function, digital output 1	[1] External brake
P505	Absolute minimum freq.	0 ... 2 Hz

The ideal release and application time for the mechanical brake depends on the brake size. The following standard values can be assumed for the respective brakes:

	BRE 5	BRE10	BRE20	BRE40	BRE60	BRE100	BRE150	BRE250
P107 [s]	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04
P114 [s]	0.04	0.06	0.09	0.1	0.12	0.15	0.28	0.3

With speed feedback via a rotary encoder, the absolute minimum frequency P505 must usually be set to 0 Hz. Otherwise the parameter should be set to the rated slip frequency of the motor according to the following formula:

$$p_{505} = \frac{(n_{syn} - n_N) \times p}{60} \text{ Hz}$$

n_{syn} : Synchronous motor speed
 n_N : Nominal motor speed
 p : Number of poles of motor

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