Dynamic braking in case of encoder failure

Translation of the "Original Dokumentation"
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Name: FKT_Bremse_Geberausfall_en

Version:

Version: 2019/45	
Change	**Letter symbol**
• Controller card KW-R27 added	STL

Previous version: 2018/44

Product version:

Product (AMK part no.)	**Firmware Version (AMK part no.)**
KW-R06 (O835) KW-R07 (O807) KW-R16 (O872) KW-R17 (O873)	AE-R05/R06 V1.13 2015/21 (205700)
KW-R24-R /	AE-R24-R V2.11 2016/46 (206643)
KW-R25 /	AE-R25 V2.02 2014/23 (205217)
KW-R26 /	AE-R26 V2.02 2014/23 (205215)
KW-R27 /	AE-R26 V2.12 2018/40 (207284)
iX / iC / iDT5	iX V1.00 2011/21 (203699)
iX(-R3) / iC(-R3) / iDT5(-R3) /	iX V2.08 2015/46 (206017)
ihXT /	ihX V1.00 2015/06 (205440)

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1 Dynamic braking in case of encoder failure

Supported hardware:	KW-R06 / KW-R16 / KW-R07 / KW-R17 / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT / KW-R24-R / KW-R25 / KW-R26 / KW-R27 /

For operating synchronous motors under control, the commutation angle is in constant requisition. It is normally measured by a position encoder. If the encoder signal fails, the motor cannot be controlled definitely any more. The software reports the error and blocks the PWM. The motor will run down or brake without control in case of field-weakening. Machine or work piece might be damaged.

With the software function 'Dynamic braking at encoder failure', an observer operates at the same time with the encoder analysis. The observer calculates the commutation angle from the output voltage and current values based on the motor model. By means of this commutation angle the encoder signal can be monitored and will replace it in case of encoder failure. At encoder failure the motor is not running down but will be braked down in torque operation mode with the torque value entered in ID33150 'Brake torque'. If ID33150 = 0 the motor is braked down in speed operation mode according ID32782 'Deceleration ramp RF inactive'. With ID33151 'Maximal angular deviation of encoder-sensorless' the sensorless evaluated rotor angle can be monitored.

The function is available only with synchronous motors.

Meaning for iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT /

This function must not be used for motors with E- or F-type encoder!

2 Relevant parameters

Parameter	Name	Meaning See document 'Parameter description' (AMK part no. 203704)
ID32773 1)	'Service bits'	ID32773.1 = 29 Dynamic braking at encoder failure active See 'ID32773 'Service bits' bit 29' on page 5.
ID32782 1)	'Deceleration ramp RF inactive'	Braking under speed control If ID33150 = 0, the drive will brake down with the set deceleration ramp time.
ID33149 1)	'Saturation current'	Current value, where the phase inductance Ls is decreased to 30 % of the start value Ls = (Ld + Lq) / 2
ID33150 1)	'Brake torque'	ID33150 ≠ 0: Braking under torque control The brake will brake down with the set torque value
ID33151 1)	'Maximal angular deviation of encoder-sensorless'	Maximum admissible deviation between encoder angle and sensorless calculated rotor angle
ID34045 1)	'Inductance path D' Ld	Direct axis inductance (See motor data sheet)
ID34046 1)	'Inductance path Q' Lq	Quadrature axis inductance (See motor data sheet)
ID34164 1)	'Terminal resistance' Rtt	Terminal resistance (See motor data sheet)
ID34167 1)	'Terminal Inductance' Ltt	Terminal inductance (See motor data sheet)
ID34233 1)	'Phase resistance' Rs	Phase resistance of the motor winding (See motor data sheet)

1) The parameter value must be set specific to the application

3 Startup instructions

ID33150 'Brake torque'

ID33150 ≠ 0: braking under torque control

ID33150 = 0: braking under speed control

Braking under speed control acc. to ID32782 'Deceleration ramp RF inactive' will work only with weak speed control parameters. The switch-off speed will be at a higher level than during braking under torque control with ID33150 'Brake torque'. So, braking under torque control should be favoured.

ID33151 'Maximal angular deviation of encoder-sensorless':

In case of rapid torque and speed changes, the deviation between the angles from encoder measurement and observer calculation might increase. If the additional encoder monitoring according to ID33151 'Maximal angular deviation of encoder-sensorless' has to be activated, useful in general with motors with resolver, the maximum admissible deviation must be increased so that no error occurs during normal operation.

Appendix

ID32773 'Service bits' bit 29

Bit no.	Condition	Meaning
29	0	KW-R06 / KW-R16 / KW-R07 / KW-R17 / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT / KW-R24-R / KW-R25 / KW-R26 / KW-R27 / Dynamic braking at encoder failure inactive
	1	KW-R06 / KW-R16 / KW-R07 / KW-R17 / iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT / KW-R24-R / KW-R25 / KW-R26 / KW-R27 / Dynamic braking at encoder failure active (Function only for synchronous motors) Parallel to encoder evaluation the rotor position is determined sensorless. At encoder failure the motor is not running down but will be braked down in torque operation mode with the torque value entered in ID33150 'Brake torque'. If ID33150 = 0 the motor is braked down in speed operation mode according ID32782 'Deceleration ramp RF inactive'. With ID33151 'Maximal angular deviation of encoder-sensorless' the sensorless evaluated rotor angle can be monitored. **iX / iC / iDT5 / iX(-R3) / iC(-R3) / iDT5(-R3) / ihXT /**  This function must not be used for motors with E- or F-type encoder!