Built-in encoder systems <u>without</u> DRIVE-CLiQ interface

For motors without an integrated DRIVE-CLiQ interface, the analog encoder signal in the drive system is converted to a digital signal. For these motors as well as external encoders, the encoder signals must be connected to SINAMICS S120 via Sensor Modules.

Built-in encoder systems <u>with</u> DRIVE-CLiQ interface

For motors with an integrated DRIVE-CLiQ interface, the analog encoder signal is internally converted to a digital signal. There is no further conversion of the encoder signal in the drive system. Motors with a DRIVE-CLiQ interface simplify the commissioning and diagnostics, for example, due to automatic identification of the encoder system.

Short designations for the encoder systems

The first letters of the short designation define the encoder type. This is followed by the resolution in signals per revolution if S/R is specified (for encoders without DRIVE-CLiQ interface) or in bits if DQ is specified (for encoders with DRIVE-CLiQ interface).

Type	Resolution / interface	
AM IC	xxxxS/R	Encoder <u>without</u> DRIVE-CLiQ interface Resolution = xxxx signals per revolution
AM AS IC	xxDQ xxDQI	Encoder <u>with</u> DRIVE-CLiQ interface Resolution = xx bit (2^{xx})
AM	Absolute encoder, multi-turn	
AS	Absolute encoder, single-turn	
IC	Incremental encoder sin/cos	

Overview of the motor encoder systems

For technical details, please see the following tables

Encoder without DRIVE-CLiQ interface	Encoder with DRIVE-CLiQ interface	Absolute position within a rotation (single-turn)	Absolute position over 4096 revolutions (multi-turn)	For use in safety applications	Identification letter in the motor order number (without DRIVE-CLiQ interface)		Identification letter in the motor order number (with DRIVE-CLiQ interface)	
					1FT7	1FK7 G2	1FT7	1FK7 G2
IC2048S/R		no	no	yes	N	A	-	-
	AS24DQI	yes	no	yes	-	-	B	B
AM2048S/R	AM24DQI	yes	yes	yes	M	E	C	C
	AS20DQI	yes	no	yes	-	-	-	Q
	AM20DQI	yes	yes	yes	-	-	-	R
Resolver p=1	R14DQ	yes	no	no	-	T	-	P
Resolver p=x	R15DQ	no	no	no	-	S	-	U

Dependency to the SINAMICS software version

Operation of the new DQI Encoders requires ***SINAMICS SW Version 4.4***

For operation in combination with earlier SW-Versions there are SW extensions for the following products:

- ***SINAMICS standalone*** ***SINAMICS 2.6 SP2 HF10***
- ***SINUMERIK 840D sl*** ***SINUMERIK 2.6 SP1 HF3***
- ***SINUMERIK 828D*** ***SINUMERIK 4.3***
- ***SIMOTION D*** ***SIMOTION 4.2***

For SINUMERIK 802D sl and 840Di sl, operation of the new DQI-encoders is not possible

Migration from 1FT7 and 1FT6 with DRIVE-CLiQ interface by sensormodule to 1FT7 with DRIVE-CLiQ interface with the new DQI-Encoder

MLFB-14	1FT7	1FT6
IC22DQ	D	D
AM22DQ	F	F

migration

MLFB-14	1FT7
AS24DQI	B
AM24DQI	C

Migration from 1FK7 G1 to G2 (with DRIVE-CLiQ Interface)

MLFB-14	1FK7-G1	
IC22DQ	D	
AM22DQ	F	
AM20DQ	L	*(SH36)*
AM16DQ	K	
AM15DQ	V	*(SH36)*
R15DQ	U	
R14DQ	P	

Migration

MLFB-14	1FK7- G2	
AS24DQI	B	
AM24DQI	C	
AM24DQI	C	
AM20DQI	R	
AM20DQI	R	
AS20DQI	Q	*)
AS20DQI	Q	*)

*) Resolver version is available too. MLFB-14 remains unchanged then.

Migration from 1FK7 G1 to 1FK7 G2

MLFB-16	1FK7 G1
IP64 without coating	0
IP65 /IP67 without coating	2
IP64 with coating	3
IP65 /IP67 with coating	5
IP65 /IP67 with coating and with metal rating plate	8

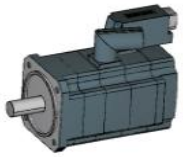
migration

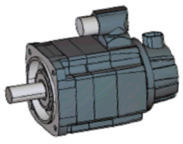
MLFB-16	1FK7 G2	
IP64 with coating	0	
IP64/65 w. coating	2	
IP64 with coating	0	
IP64/65 w. coating	2	
IP64/65 w. coating	2	+ option 'Q31' for metal rating plate

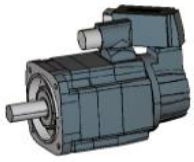
Motor length: 1FK7 G1 vs. 1FK7 G2

1FK7 CT	Length 1FK7 G1		Length 1FK7 G2 DQI encoder		Length difference G1-G2_DQI		Length 1FK7 G2 SMI_M23		Length difference G1-G2_SMI_M23	
Brake	without	with	w/o	with	w/o	with	w/o	with	w/o	with
1FK7032	175	200	173	200	2	0	173	200	2	0
1FK7034	200	225	198	225	2	0	198	225	2	0
1FK7040	155	184	147	179	8	5	152	184	3	0
1FK7042	182	211	174	206	8	5	179	211	3	0
1FK7060	180	223	168	203	12	20	173	208	7	15
1FK7062	not available		190	226	new type		195	231	new type	
1FK7063	225	268	213	248	12	20	218	253	7	15
1FK7080	179	206	171	223	8	-17	176	228	3	-22
1FK7081	not available		190	242	new type		195	247	new type	
1FK7083	217	268	209	261	8	7	214	266	3	2
1FK7084	not available		229	281	new type		234	286	new type	
1FK7100	208	227	193	220	15	7	188	225	20	2
1FK7101	234	263	209	261	25	2	214	266	20	-3
1FK7103	260	289	235	287	25	2	240	292	20	-3
1FK7105	312	341	287	339	25	2	292	344	20	-3

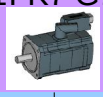
1FK7 HD	Length 1FK7 G1		Length 1FK7 G2 DQI encoder		Length difference G1-G2_DQI		Length 1FK7 G2 SMI_M23		Length difference G1-G2_SMI_M23	
Bremse	without	with	w/o	with	w/o	with	w/o	with	w/o	with
1FK7033	194	219	183	210	11	9	183	210	11	9
1FK7043	212	241	200	232	12	9	205	237	7	4
1FK7044	237	266	225	257	12	9	230	262	7	4
1FK7061	208	251	203	238	5	13	208	243	0	8
1FK7064	272	315	267	302	5	13	272	307	0	8
1FK7085	283	326	257	309	26	17	262	314	21	12
1FK7086	283	326	257	309	26	17	262	314	21	12







Brake data: 1FK7 Compact G1 vs. 1FK7 Compact G2

1FK7 CT	Rotor inertia 1FK7 G1 		Rotor inertia 1FK7 G2 		Difference G2 - G1		minimum holding torque for the brake  		
Brake	without	with	w/o	with	w/o	with	G1	G2	Difference
1FK7032	0,61	0,69	0,65	0,75	7%	9%	1,1	1,9	0,8
1FK7034	0,90	0,98	0,9	1,0	0%	2%	1,1	1,9	0,8
1FK7040	1,69	2,13	1,6	1,9	-5%	-10%	3,2	4	0,8
1FK7042	3,01	3,73	2,9	3,2	-4%	-14%	3,2	4	0,8
1FK7060	7,95	10,20	7,7	8,7	-3%	-15%	13	13,2	0,2
1FK7062	not available		11,2	12,2	new type		-	13,2	new type
1FK7063	15,1	17,3	14,7	15,7	-3%	-9%	13	13,2	0,2
1FK7080	15,0	18,1	14,2	17,5	-5%	-3%	10	22	12
1FK7081	not available		20,0	23,5	new type		-	22	new type
1FK7083	27,3	35,9	26,0	29,5	-5%	-18%	22	22	0
1FK7084	not available		32,5	35,5	new type		-	22	new type
1FK7100	55,3	63,9	54	62	-2%	-3%	22	23	1
1FK7101	79,9	92,3	79	87	-1%	-6%	41	43,2	2,2
1FK7103	105	118	104	112	-1%	-5%	41	43,2	2,2
1FK7105	156	169	154	161	-1%	-5%	41	43,2	2,2

1FK7 HD	Rotor inertia 1FK7 G1 		Rotor inertia 1FK7 G2 		Difference G2 - G1		minimum holding torque for the brake  		
Brake	without	with	w/o	with	w/o	with	G1	G2	Difference
1FK7033	0,27	0,30	0,25	0,35	-7%	17%	1,1	1,9	0,8
1FK7043	1,01	1,14	1,00	1,36	-1%	19%	3,2	4	0,8
1FK7044	1,28	1,41	1,26	1,62	-2%	15%	3,2	4	0,8
1FK7061	3,4	3,7	4,1	5,1	21%	36%	13	13,2	0,2
1FK7064	6,5	6,8	7,5	8,5	15%	24%	13	13,2	0,2
1FK7085	23	25	22,0	25,5	-4%	2%	22	22	0
1FK7086	23	25	22,0	25,5	-4%	2%	22	22	0

The rotor inertia is given in $kgm^2 * 10^{-4}$

The holding torque is given in Nm