

SKF CASM BLDC

Technical Document

Getting started and motor installation instruction

Release November 18, 2014
Revision V1.0 / PC

Contents

1	System Overview.....	2
1.1	Possible motor – CASM combinations.....	2
1.2	Dunker motor configuration.....	2
1.3	Needed components for operation	3
1.4	Operating modes.....	3
1.4.1	Operation with a PLC system.....	3
1.4.2	Repetitive, autonomous run.....	3
2	Wiring instruction	4
2.1	BG45 PI wiring instruction	4
2.2	BG65S PI wiring instruction.....	5
2.3	BG75 PI wiring instruction	7
3	General Overview	9
3.1	Simple Positioning Module.....	9
3.2	Standard Positioning Module.....	9
3.3	Advanced Positioning Module	9
3.4	Motion Profile Definition	9
3.5	First Steps.....	9
3.6	General Interface.....	10
3.7	Motion record option	11
4	Simple Positioning Module	12
4.1	Initialization	12
4.2	Controlling	12
4.3	Automatic modus	13
4.4	Getting started.....	13
5	Standard Positioning Module	14
5.1	Initialization	14
5.2	Controlling	14
5.3	Automatic modus	15
5.4	Getting started.....	15
6	Advanced Positioning Module	16
6.1	Initialization	16
6.2	Controlling	16
6.3	Automatic modus	17
6.4	Getting started.....	17

1 System Overview

CASM electric cylinders powered by brushless DC motors are ideally suited for fast and powerful movements. Replacement of pneumatic cylinders has never been easier. Just parameterize the cylinder by the SKF Drive Assistant software with a few steps and benefit from variable speed, high positioning accuracy, high force and long lifetime. The highly efficient electric cylinder will help to increase productivity by less energy consumption and therefore less CO₂ emission. Due to the tremendous energy savings compared to pneumatic solutions, the investment cost will be paid back in a short time period. After the parameterization, the DC powered cylinder can be operated independently by PLC or by switches. The motion controller is already built in.



Axial motor configuration



Parallel motor configuration

1.1 Possible motor – CASM combinations

SKF offers three different linear unit types called CASM combined with four different brushless DC motors. The motor can be attached, either in an axial or in a parallel configuration.

Linear unit	Dunker motors					
	BG45		BG65S		BG75	
	Axial	Parallel	Axial	Parallel	Axial	Parallel
CASM-32 (LS/BS/BN)	X	X				
CASM-40 (LS/BS/BN)			X	X	X	X
CASM-63 (LS/BN/BF)					X	X

1.2 Dunker motor configuration

The brushless DC motors offered from SKF contain the following elements:

1. Brushless DC motor
2. Encoder
3. Power of brake
4. On board positioning, current* and velocity* logic

* Part of the Dunker motoren standard software

1.3 Needed components for operation

The needed components for a normal operation of the different actuator systems are given in the bellow table. A more detailed view on the motor wiring is given in chapter 2.

Combination	Actuator			Cable			Power supply		Programming cable
	Linear unit	Motor adapter	Motor	Power cable	Electronics cable	Ballast connector	Power supply	Electronics supply	
CASM-32 / BG45	X	X	X	X [†]		-	24V DC		X
CASM-40 / BG65S	X	X	X	X [†]		X	40V DC	24V DC	X
CASM-40 / BG75	X	X	X	X	X	X	40V DC	24V DC	X
CASM-63 / BG75	X	X	X	X	X	X	40V DC	24V DC	X

1.4 Operating modes

It is possible to operate the actuator in combination with a PLC module, control it by buttons or repetitive run it in an autonomous modus.

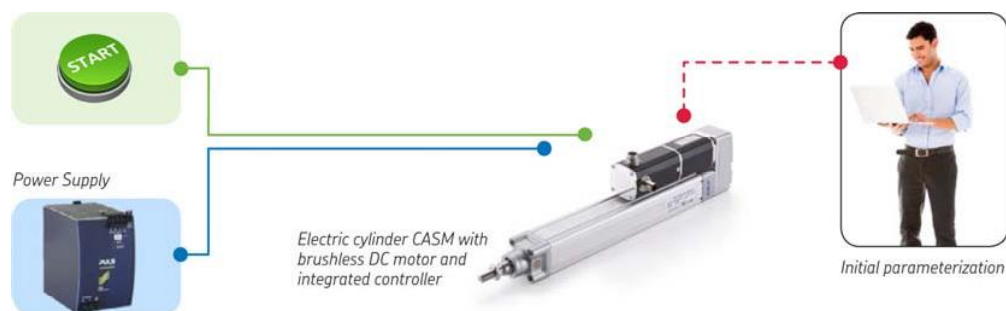
1.4.1 Operation with a PLC system

The logic and timing of the positions, stored inside of the motor, is done by the program of the PLC.



1.4.2 Repetitive, autonomous run

The actuator operates repetitively according a predefined sequence of selected positions. Therefore the timing between the positions is stored inside of the motor. Start and stop of the sequence can be controlled by a button or another constant input signal.



[†] Power and electronics cable is joined

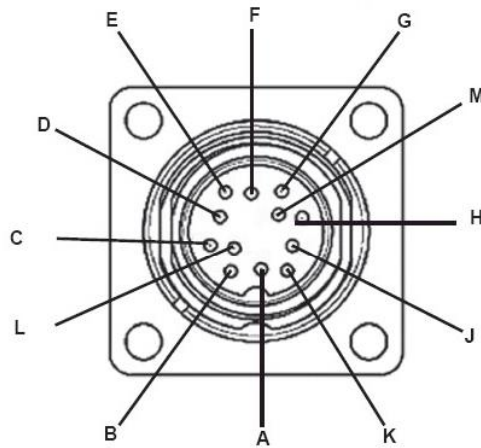
2 Wiring instruction

Please refer to the wiring instruction manual for the brushless DC motors BG45 PI, BG65S PI and BG75 PI.

2.1 BG45 PI wiring instruction

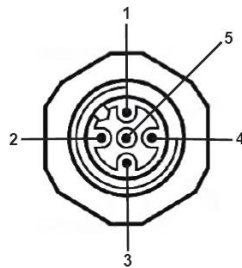
Power supply electronic and signal interface.

Motor plug: Round plug to DIN 45326, Binder, Series 723. The 12-pin motor connector supplies power for the motor and a 24V supply for the control electronics.

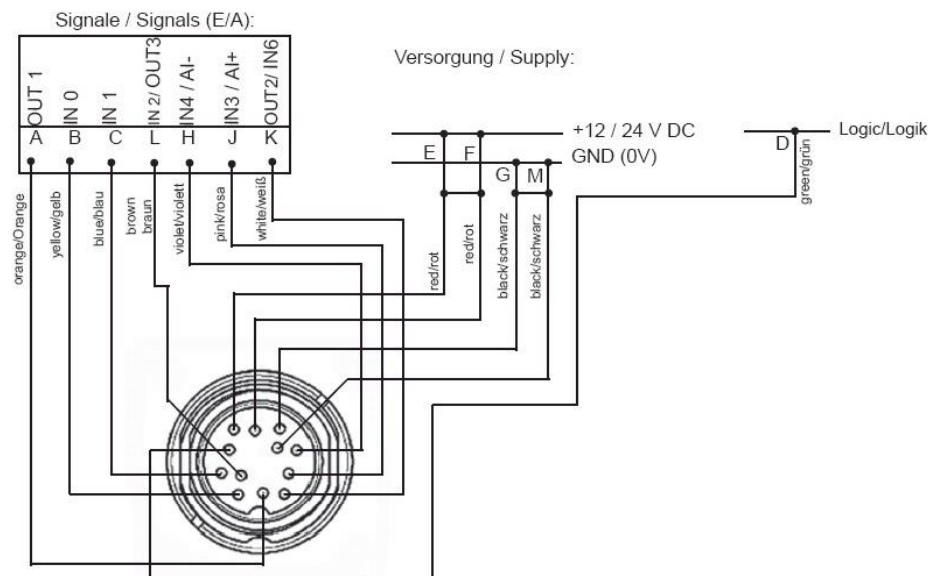


Plug- Pin	Connection	Lead colour in connection cable with 12-pin connector
A	OUT1	orange
B	IN0	yellow
C	IN1	blue
D	U _C + 24V DC	green
E + F	U _E +12/ 24V DC	red
G + M	GND	black
H	IN4	violet
J	IN3	pink
K	OUT2	white
L	IN2	brown

Parameterization: Motor plug: Round plug M12



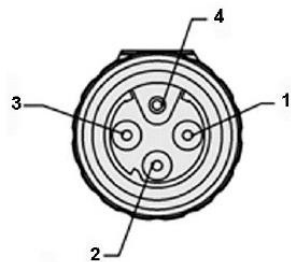
Connection electronic supply interface



6/17

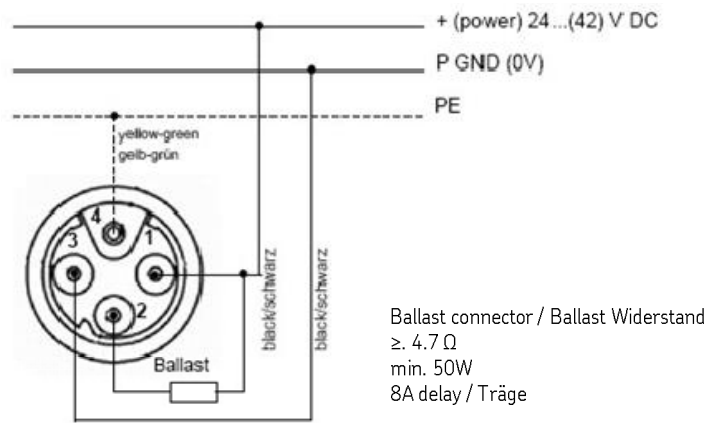
2.3 BG75 PI wiring instruction

Power supply



Pin	Signal	Color	Wiring
1	Power	Black	1
2	Reference	Black	2
3	Reference	Black	3
4	Earth wire	Yellow-green	

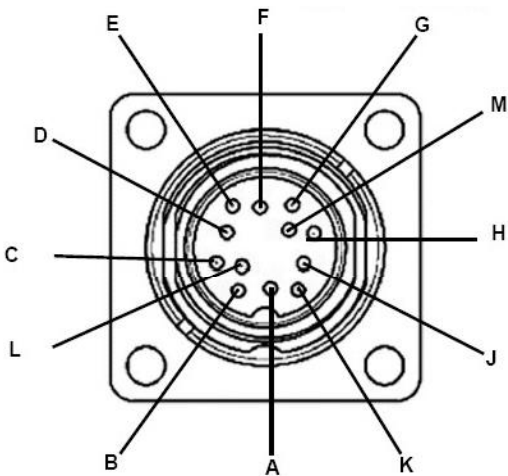
Connection motor power supply



Ballast connector / Ballast Widerstand
≥ 4.7 Ω
min. 50W
8A delay / Träge

Power supply electronic and signal interface

Motor plug: Round plug to DIN 45326, Binder, Series 723. The 12-pin motor connector supplies power for the motor and a 24V supply for the control electronics.



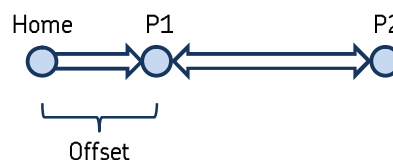
Pin	Signal	Color	Wiring
1	Power	Black	1
2	Reference	Black	2
3	Reference	Black	3
4	Earth wire	Yellow-green	
5	Power	Black	1
6	Reference	Black	2
7	Reference	Black	3
8	Power	Black	1
9	Reference	Black	2
10	Reference	Black	3
11	Power	Black	1
12	Reference	Black	2
13	Reference	Black	3
14	Power	Black	1
15	Reference	Black	2
16	Reference	Black	3
17	Power	Black	1
18	Reference	Black	2
19	Reference	Black	3
20	Power	Black	1
21	Reference	Black	2
22	Reference	Black	3
23	Power	Black	1
24	Reference	Black	2
25	Reference	Black	3
26	Power	Black	1
27	Reference	Black	2
28	Reference	Black	3
29	Power	Black	1
30	Reference	Black	2
31	Reference	Black	3
32	Power	Black	1
33	Reference	Black	2
34	Reference	Black	3
35	Power	Black	1
36	Reference	Black	2
37	Reference	Black	3
38	Power	Black	1
39	Reference	Black	2
40	Reference	Black	3
41	Power	Black	1
42	Reference	Black	2
43	Reference	Black	3
44	Power	Black	1
45	Reference	Black	2
46	Reference	Black	3
47	Power	Black	1
48	Reference	Black	2
49	Reference	Black	3
50	Power	Black	1
51	Reference	Black	2
52	Reference	Black	3
53	Power	Black	1
54	Reference	Black	2
55	Reference	Black	3
56	Power	Black	1
57	Reference	Black	2
58	Reference	Black	3
59	Power	Black	1
60	Reference	Black	2
61	Reference	Black	3
62	Power	Black	1
63	Reference	Black	2
64	Reference	Black	3
65	Power	Black	1
66	Reference	Black	2
67	Reference	Black	3
68	Power	Black	1
69	Reference	Black	2
70	Reference	Black	3
71	Power	Black	1
72	Reference	Black	2
73	Reference	Black	3
74	Power	Black	1
75	Reference	Black	2
76	Reference	Black	3
77	Power	Black	1
78	Reference	Black	2
79	Reference	Black	3
80	Power	Black	1
81	Reference	Black	2
82	Reference	Black	3
83	Power	Black	1
84	Reference	Black	2
85	Reference	Black	3
86	Power	Black	1
87	Reference	Black	2
88	Reference	Black	3
89	Power	Black	1
90	Reference	Black	2
91	Reference	Black	3
92	Power	Black	1
93	Reference	Black	2
94	Reference	Black	3
95	Power	Black	1
96	Reference	Black	2
97	Reference	Black	3
98	Power	Black	1
99	Reference	Black	2
100	Reference	Black	3
101	Power	Black	1
102	Reference	Black	2
103	Reference	Black	3
104	Power	Black	1
105	Reference	Black	2
106	Reference	Black	3
107	Power	Black	1
108	Reference	Black	2
109	Reference	Black	3
110	Power	Black	1
111	Reference	Black	2
112	Reference	Black	3
113	Power	Black	1
114	Reference	Black	2
115	Reference	Black	3
116	Power	Black	1
117	Reference	Black	2
118	Reference	Black	3
119	Power	Black	1
120	Reference	Black	2
121	Reference	Black	3
122	Power	Black	1
123	Reference	Black	2
124	Reference	Black	3
125	Power	Black	1
126	Reference	Black	2
127	Reference	Black	3
128	Power	Black	1
129	Reference	Black	2
130	Reference	Black	3
131	Power	Black	1
132	Reference	Black	2
133	Reference	Black	3
134	Power	Black	1
135	Reference	Black	2
136	Reference	Black	3
137	Power	Black	1
138	Reference	Black	2
139	Reference	Black	3
140	Power	Black	1
141	Reference	Black	2
142	Reference	Black	3
143	Power	Black	1
144	Reference	Black	2
145	Reference	Black	3
146	Power	Black	1
147	Reference	Black	2
148	Reference	Black	3
149	Power	Black	1
150	Reference	Black	2
151	Reference	Black	3
152	Power	Black	1
153	Reference	Black	2
154	Reference	Black	3
155	Power	Black	1
156	Reference	Black	2
157	Reference	Black	3
158	Power	Black	1
159	Reference	Black	2
160	Reference	Black	3
161	Power	Black	1
162	Reference	Black	2
163	Reference	Black	3
164	Power	Black	1
165	Reference	Black	2
166	Reference	Black	3
167	Power	Black	1
168	Reference	Black	2
169	Reference	Black	3
170	Power	Black	1
171	Reference	Black	2
172	Reference	Black	3
173	Power	Black	1
174	Reference	Black	2
175	Reference	Black	3
176	Power	Black	1
177	Reference	Black	2
178	Reference	Black	3
179	Power	Black	1
180	Reference	Black	2
181	Reference	Black	3
182	Power	Black	1
183	Reference	Black	2
184	Reference	Black	3
185	Power	Black	1
186	Reference	Black	2
187	Reference	Black	3
188	Power	Black	1
189	Reference	Black	2
190	Reference	Black	3
191	Power	Black	1
192	Reference	Black	2
193	Reference	Black	3
194	Power	Black	1
195	Reference	Black	2
196	Reference	Black	3
197	Power	Black	1
198	Reference	Black	2
199	Reference	Black	3
200	Power	Black	1
201	Reference	Black	2
202	Reference	Black	3
203	Power	Black	1
204	Reference	Black	2
205	Reference	Black	3
206	Power	Black	1
207	Reference	Black	2
208	Reference	Black	3
209	Power	Black	1
210	Reference	Black	2
211	Reference	Black	3
212	Power	Black	1
213	Reference	Black	2
214	Reference	Black	3
215	Power	Black	1
216	Reference	Black	2
217	Reference	Black	3
218	Power	Black	1
219	Reference	Black	2
220	Reference	Black	3
221	Power	Black	1
222	Reference	Black	2
223	Reference	Black	3
224	Power	Black	1
225	Reference	Black	2
226	Reference	Black	3
227	Power	Black	1
228	Reference	Black	2
229	Reference	Black	3
230	Power	Black	1
231	Reference	Black	2
232	Reference	Black	3
233	Power	Black	1
234	Reference	Black	2
235	Reference	Black	3
236	Power	Black	1
237	Reference	Black	2
238	Reference	Black	3
239	Power	Black	1
240	Reference	Black	2
241	Reference	Black	3
242	Power	Black	1
243	Reference	Black	2
244	Reference	Black	3
245	Power	Black	1
246	Reference	Black	2
247	Reference	Black	3
248	Power	Black	1
249	Reference	Black	2
250	Reference	Black	3
251	Power	Black	1
252	Reference	Black	2
253	Reference	Black	3
254	Power	Black	1
255	Reference	Black	2
256	Reference	Black	3
257	Power	Black	1
258	Reference	Black	2
259	Reference	Black	3
260	Power	Black	1
261	Reference	Black	2
262	Reference	Black	3
263	Power	Black	1
264	Reference	Black	2
265	Reference	Black	3
266	Power	Black	1
267	Reference	Black	2
268	Reference	Black	3
269	Power	Black	1
270	Reference	Black	2
271	Reference	Black	3
272	Power	Black	1
273	Reference	Black	2
274	Reference	Black	3
275	Power	Black	1
276	Reference	Black	2
277	Reference	Black	3
278	Power	Black	1
279	Reference	Black	2
280	Reference	Black	3
281	Power	Black	1
282	Reference	Black	2
283	Reference	Black	3
284	Power	Black	1
285	Reference	Black	2
286	Reference	Black	3
287	Power	Black	1
288	Reference	Black	2
289	Reference	Black	3
290	Power	Black	1
291	Reference	Black	2
292	Reference	Black	3
293	Power	Black	1
294	Reference	Black	2
295	Reference	Black	3
296	Power	Black	1
297	Reference	Black	2
298	Reference	Black	3
299	Power	Black	1
300	Reference	Black	2
301	Reference	Black	3
302	Power	Black	1
303	Reference	Black	2
304	Reference	Black	3
305	Power	Black	1
306	Reference	Black	2
307	Reference	Black	3
308	Power	Black	1
309	Reference	Black	2
310	Reference	Black	3
311	Power	Black	1
312	Reference	Black	2
313	Reference	Black	3
314	Power	Black	1
315	Reference	Black	2
316	Reference	Black	3
317	Power	Black	1
318	Reference	Black	2
319	Reference	Black	3
320	Power	Black	1
321	Reference	Black	2
322	Reference	Black	3
323	Power	Black	1
324	Reference	Black	2
325	Reference	Black	3
326	Power	Black	1
327	Reference	Black	2
328	Reference	Black	3
329	Power	Black	1
330	Reference	Black	2
331	Reference	Black	3
332	Power	Black	1
333	Reference	Black	2
334	Reference	Black	3
335	Power	Black	1
336	Reference	Black	2
337	Reference	Black	3
338	Power	Black	1
339	Reference	Black	2
340	Reference	Black	3
341	Power	Black	1
342	Reference	Black	2
343	Reference	Black	3
344	Power	Black	1
345	Reference	Black	2
346	Reference	Black	3
347	Power	Black	1
348	Reference	Black	2
349	Reference	Black	3
350	Power	Black	1
351	Reference	Black	2
352	Reference	Black	3
353	Power	Black	1
354	Reference	Black	2
355	Reference	Black	3
356	Power	Black	1
357	Reference	Black	2
358	Reference	Black	3
359	Power	Black	1
360	Reference	Black	2
361	Reference	Black	3
362	Power	Black	1
363	Reference	Black	2
364	Reference	Black	3
365	Power	Black	1
366	Reference	Black	2
367	Reference	Black	3
368	Power	Black	1
369	Reference	Black	2
370	Reference	Black	3
371	Power	Black	1
372	Reference	Black	2
373	Reference	Black	3
374	Power	Black	1
375	Reference	Black	2
376	Reference	Black	3
377	Power	Black	1
378	Reference	Black	2
379	Reference	Black	3
380	Power	Black	1
381	Reference	Black	2
382	Reference	Black	3
383	Power	Black	1
384	Reference	Black	2
385	Reference	Black	3
386	Power	Black	1
387	Reference	Black	2
388	Reference	Black	3
389	Power	Black	1
390	Reference	Black	2
391	Reference	Black	3
392	Power	Black	1
393	Reference	Black	2
394	Reference	Black	3
395	Power	Black	1
396	Reference	Black	2
397	Reference	Black	3
398	Power	Black	1
399	Reference	Black	2
400	Reference	Black	3
401	Power	Black	1
402	Reference	Black	2
403	Reference	Black	3
404	Power	Black	1
405	Reference	Black	2
406	Reference	Black	3
407	Power	Black	1
408	Reference	Black	2
409	Reference	Black	3
410	Power	Black	1
411	Reference	Black	2
412	Reference	Black	3
413	Power	Black	1
414	Reference	Black	2
415	Reference	Black	3
416			

3 General Overview

3.1 Simple Positioning Module

Drive between two positions (chapter 4)

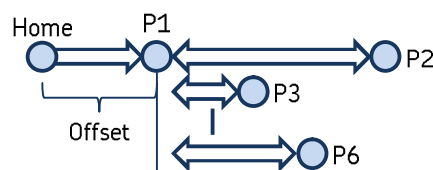
One velocity and accelerations defined for all positions.



3.2 Standard Positioning Module

Define up to six positions (chapter 5)

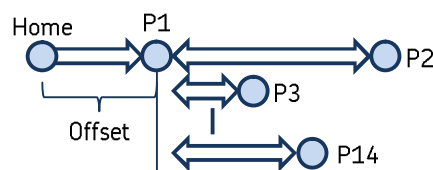
One velocity and accelerations defined for all positions.



3.3 Advanced Positioning Module

Define up to 14 positions (chapter 6)

Individual velocity and accelerations defined each motion profile.

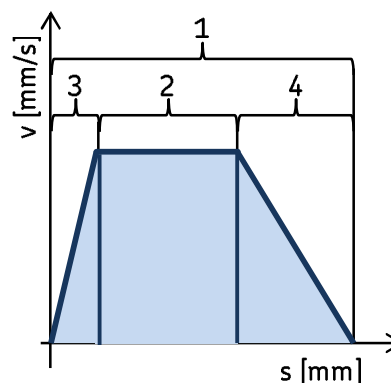


3.4 Motion Profile Definition

A motion profile is defined as following:

1. Position (stroke) in mm
2. Velocity in mm/s
3. Acceleration in mm/s^2
4. Deceleration in mm/s^2

The profile is shown on the right hand side. The numbers correspond to the above list.

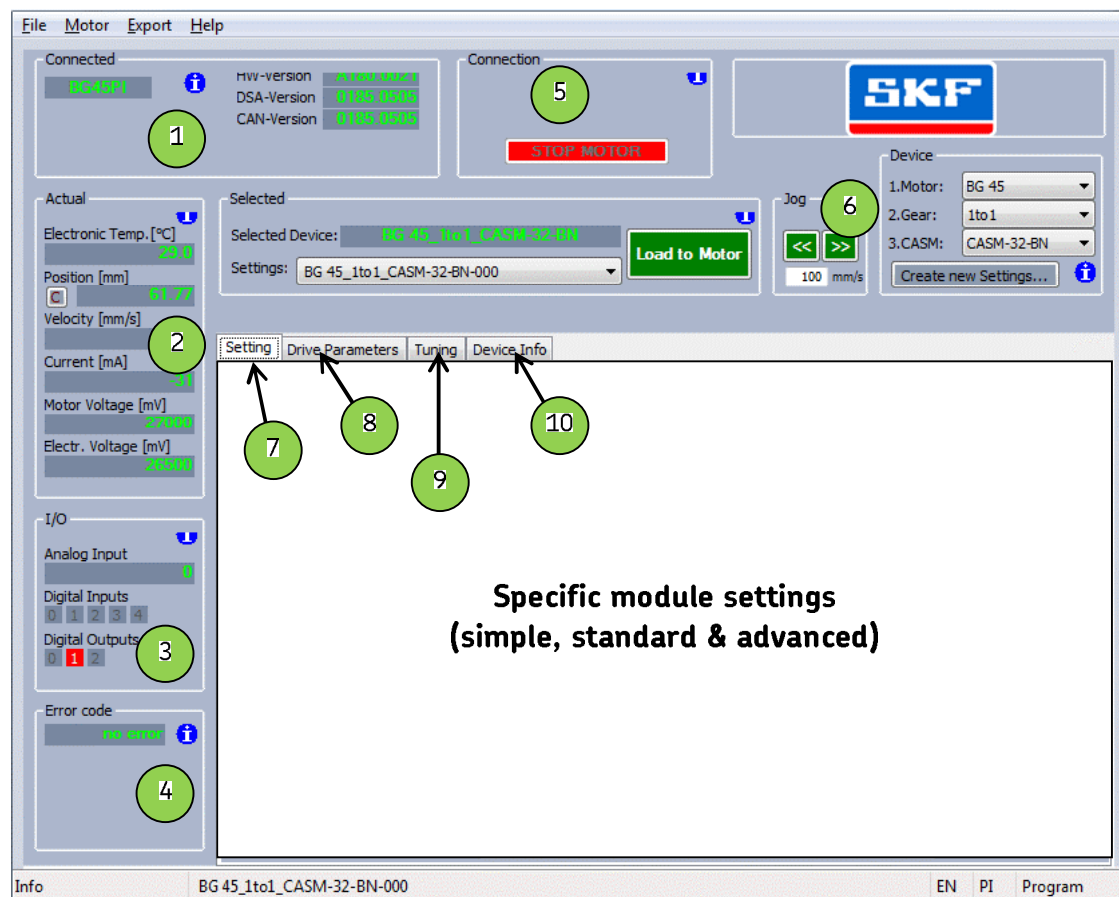


3.5 First Steps

1. Choose the positioning module who fits best to your application.
2. Activate the module of your choice by double-click the module name. If you only click once more information's about the module are shown.
3. Choose your motor – CASM combination in section **Device** or choose a previously defined setting in section **Selected**.
4. Define the driving direction in section **Direction of moving**. If you choose **Extracting** the home position will be at a retracted actuator position, if your choice is **Retracting** the home position is located at an extended actuator position.
5. Define the way to home the actuator in section **Home**.
6. Define the driving positions in section **Positions**. If your motor includes a break activate the section **Break management**.
7. Connect the motor by the programming cable and press **Load to Motor** in section **Selected**.
8. Perform a homing to find the zero position. Now the actuator is ready to use.

3.6 General Interface

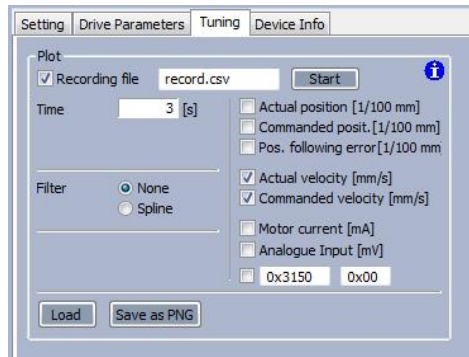
1. Motor type and software information
2. Real time motor information
3. Real time I/O information
4. Error output
5. Connection node identification
6. Manual positioning mode
7. Specific module setting tab. Three modules available (simple, standard and advanced)
8. Drive parameter overview tab
9. Plot recording tab
10. Device information tab



3.7 Motion record option

Select the Tuning tab to record the movement of the actuator.

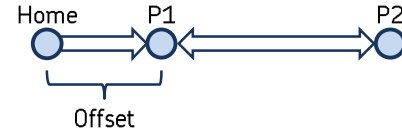
1. Specify the time period for your record and define the documents name for your recorded data e.g. `record.csv`. The document gets stored on your local drive in the active program module (e.g. for the Advanced module: `C:\Program Files\SKF\Advanced\record.csv`).
2. Choose the parameters for recording on the right side by activating the check box
3. Start the recording by the button **Start**. During recording the interface gets frozen and all actual parameters are shown in yellow. After record the interface returns to normal behavior.
4. As result of the recording an additional window occurs with the recorded data. This picture can be saved by selecting the button **Save as PNG** and will be stored in the **Records** folder of the actual module.
5. For further processing the recorded `record.csv` file can be opened in MS Excel.



4 Simple Positioning Module

4.1 Initialization

BG motors sold by SKF are equipped by an incremental encoder. Therefore it is necessary to perform a reference drive (Homing) after motor reprogramming and power cut off. Standardized the motor is delivered by SKF with the function **Encoder** out of the **Position feedback** section (B).



It is possible to emulate absolute encoder functionality by choosing the QAE function in the **Position feedback** section. With this function it is mandatory to keep the actuator position safely during reprogramming and power cut off periods.

Home is detectable by:

- Reference or limit switch
- Hard stop
- Actual position

Motor	Continues current [mA]	Peak current [mA]	Motor resolution [counts]
BG45x30PI 24V	5'000	20'000	1024
BG65Sx50PI 40V	10'000	24'000	4096
BG75x75PI 40V	20'800	48'000	4096

Before operation get sure that the allowable **peak-** and **continues-current** level is sufficient for your application (A). Please find the allowable current levels and the motor resolution for the different motor types in the table below.

4.2 Controlling

The motor is controlled by binary input signals. Therefore five inputs (IN) and two outputs (OUT) lines are available. The value 0 (zero) of a binary means not active (0 VDC), 1 means active (24 VDC).

- IN0: Reference or limit switch signal for homing
- IN1: Begin homing signal
- IN2 – IN3: Drive to position signal
- IN4: Motor enabling

IN0	Function
0	Limit switch OFF
1	Limit switch ON

OUT1	OUT2	Status
0	0	Motor disabled or Error or no Homing
1	0	Stopped, Ready, No Error, Homing done
0	1	Moving
1	1	Not used

IN1	IN2	IN3	Function
0	0	0	Clear error and STOP
1	0	0	Begin homing
0	1	0	Position 1
0	0	1	Position 2

IN4	Function
0	Motor movement disabled
1	Motor movement enabled

If the brake management is activated, the status of the engaged or disengaged brake can be detected by output zero (OUT0).

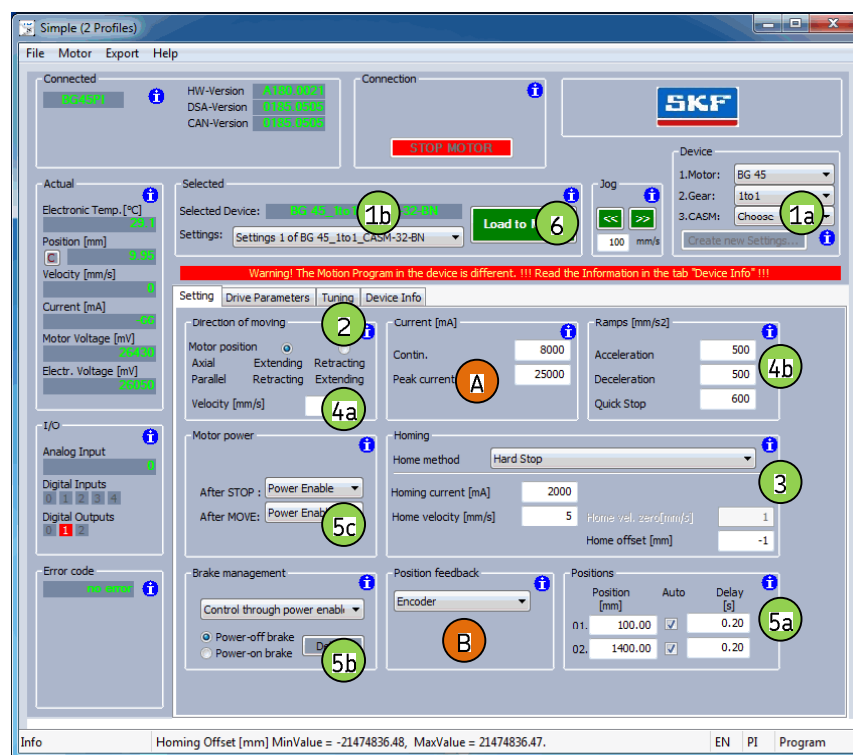
OUT0	Status
0	Break is active (no voltage at break)
1	Break is not active (voltage at break)

4.3 Automatic modus

By activating the **Auto** column for more than one position (see point 5a in the bellow picture), the autonomous operating modus gets activated. In the autonomic modus the actuator will drive repeatedly between the different positions by considering the delay time after each step. The autonomous modus gets activated by a signal on the four input lines:

IN1	IN2	IN3	IN4	Function
0	0	0	0	Stop
1	1	1	1	Autonomous modus

4.4 Getting started

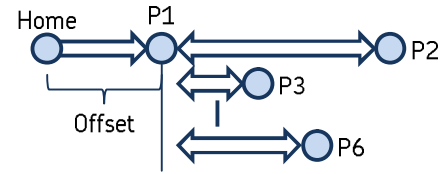


1. Choose your motor – CASM combination in section **Device** (1a) or choose a previously defined setting in section **Selected** (1b).
2. Define the driving direction in section **Direction of moving**. If you choose **Extracting** the home position will be at a retracted actuator position, if your choice is **Retracting** the home position is located at an extended actuator position.
3. Define the way to home the actuator in section **Home**.
4. Set the driving **velocity** (4a) and the acceleration and deceleration **ramps** (4b).
5. Define the driving positions in section **Positions** (5a). If your motor includes a break activate the section **Break management** (5b). If the motor does not include a break choose the motor behavior after an emergency STOP or after a MOVE to a defined position (5c).
6. Connect the motor by the programming cable and press **Load to Motor** (6) in section **Selected**.
7. Perform a homing to find the zero position. Now the actuator is ready to use.

5 Standard Positioning Module

5.1 Initialization

BG motors sold by SKF are equipped by an incremental encoder. Therefore it is necessary to perform a reference drive (Homing) after motor reprogramming and power cut off. Standardized the motor is delivered by SKF with the function **Encoder** out of the **Position feedback** section (B).



It is possible to emulate absolute encoder functionality by choosing the QAE function in the **Position feedback** section. With this function it is mandatory to keep the actuator position safely during reprogramming and power cut off periods.

Home is detectable by:

- Reference or limit switch
- Hard stop
- Actual position

Motor	Continues current [mA]	Peak current [mA]	Motor resolution [counts]
BG45x30PI 24V	5'000	20'000	1024
BG65Sx50PI 40V	10'000	24'000	4096
BG75x75PI 40V	20'800	48'000	4096

Before operation get sure that the allowable **peak-** and **continues-current** level is sufficient for your application (A). Please find the allowable current levels and the motor resolution for the different motor types in the table below.

5.2 Controlling

The motor is controlled by binary input signals. Therefore five inputs (IN) and two outputs (OUT) lines are available. The value 0 (zero) of a binary means not active (0 VDC), 1 means active (24 VDC).

- IN0: Reference or limit switch signal for homing
- IN1: Begin homing signal
- IN2 – IN3: Drive to position signal
- IN4: Motor enabling

IN0	Function
0	Limit switch OFF
1	Limit switch ON

OUT1	OUT2	Status
0	0	Motor disabled or Error or no Homing
1	0	Stopped, Ready, No Error, Homing done
0	1	Moving
1	1	Not used

IN1	IN2	IN3	Function
0	0	0	Clear error and STOP
1	0	0	Begin homing
0	1	0	Position 1
1	1	0	Position 2
0	0	1	Position 3
1	0	1	Position 4
0	1	1	Position 5
1	1	1	Position 6

If the brake management is activated, the status of the engaged or disengaged brake can be detected by output zero (OUT0).

OUT0	Status
0	Break is active (no voltage at break)
1	Break is not active (voltage at break)

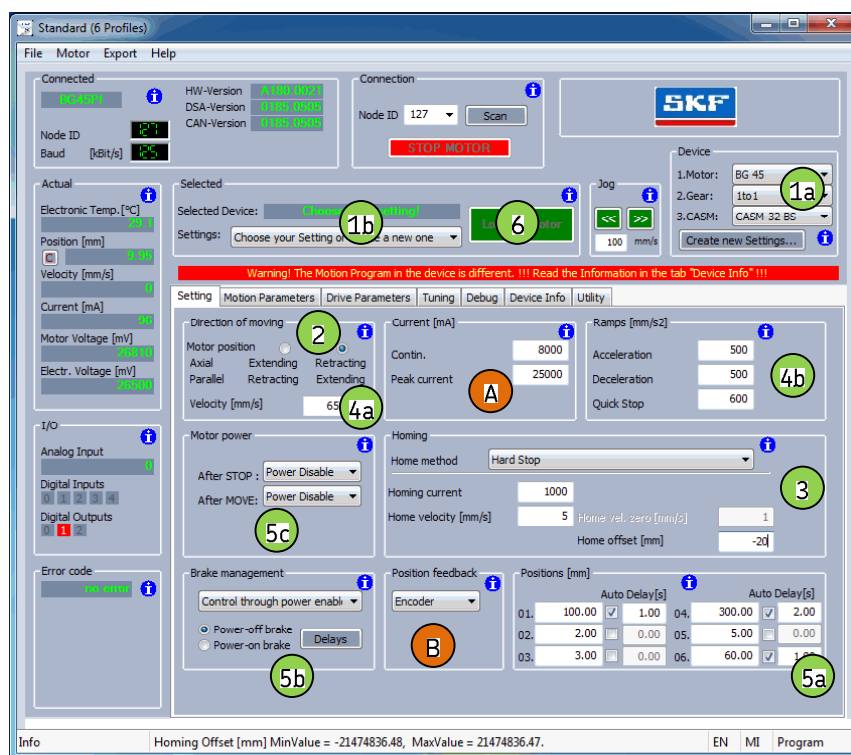
IN4	Function
0	Motor movement disabled
1	Motor movement enabled

5.3 Automatic modus

By activating the **Auto** column for more than one position (see point 5a in the bellow picture), the autonomous operating modus gets activated. In the autonomic modus the actuator will drive repeatedly between the different positions by considering the delay time after each step. The autonomous modus gets activated by a signal on the four input lines:

IN1	IN2	IN3	IN4	Function
0	0	0	0	Stop
1	1	1	1	Autonomous modus

5.4 Getting started

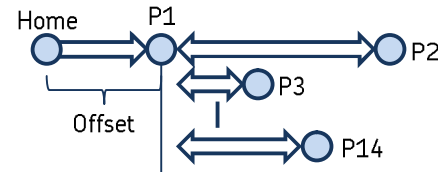


1. Choose your motor – CASM combination in section **Device** (1a) or choose a previously defined setting in section **Selected** (1b).
2. Define the driving direction in section **Direction of moving**. If you choose **Extracting** the home position will be at a retracted actuator position, if your choice is **Retracting** the home position is located at an extended actuator position.
3. Define the way to home the actuator in section **Home**.
4. Set the driving **velocity** (4a) and the acceleration and deceleration **ramps** (4b).
5. Define the driving positions in section **Positions** (5a). If your motor includes a break activate the section **Break management** (5b). If the motor does not include a break choose the motor behavior after an emergency STOP or after a MOVE to a defined position (5c).
6. Connect the motor by the programming cable and press **Load to Motor** (6) in section **Selected**.
7. Perform a homing to find the zero position. Now the actuator is ready to use.

6 Advanced Positioning Module

6.1 Initialization

BG motors sold by SKF are equipped by an incremental encoder. Therefore it is necessary to perform a reference drive (Homing) after motor reprogramming and power cut off. Standardized the motor is delivered by SKF with the function **Encoder** out of the **Position feedback** section (B).



It is possible to emulate absolute encoder functionality by choosing the QAE function in the **Position feedback** section. With this function it is mandatory to keep the actuator position safely during reprogramming and power cut off periods.

Home is detectable by:

- Reference or limit switch
- Hard stop
- Actual position

Motor	Continues current [mA]	Peak current [mA]	Motor resolution [counts]
BG45x30PI 24V	5'000	20'000	1024
BG65Sx50PI 40V	10'000	24'000	4096
BG75x75PI 40V	20'800	48'000	4096

Before operation get sure that the allowable **peak-** and **continues-current** level is sufficient for your application (A). Please find the allowable current levels and the motor resolution for the different motor types in the table below.

6.2 Controlling

The motor is controlled by binary input signals. Therefore five inputs (IN) and two outputs (OUT) lines are available. The value 0 (zero) of a binary means not active (0 VDC), 1 means active (24 VDC).

IN0	Function
0	Limit switch OFF
1	Limit switch ON

- IN0: Reference or limit switch signal for homing
- IN1: Begin homing signal
- IN2 – IN4: Drive to position signal

OUT1	OUT2	Status
0	0	Error
1	0	Stopped, Ready, no Error
0	1	No Homing, no Error
1	1	Moving, no Error

If the brake management is activated, the status of the engaged or disengaged brake can be detected by output zero (OUT0).

OUT0	Status
0	Break is active (no voltage at break)
1	Break is not active (voltage at break)

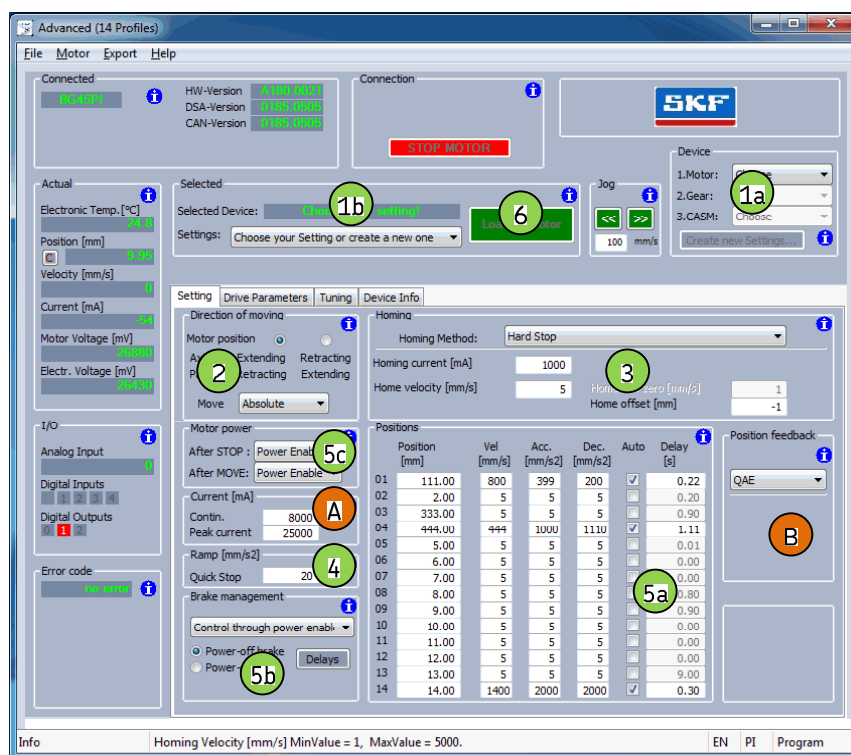
IN1	IN2	IN3	IN4	Function
0	0	0	0	Clear error and STOP
1	0	0	0	Begin homing
0	1	0	0	Position 1
1	1	0	0	Position 2
0	0	1	0	Position 3
1	0	1	0	Position 4
0	1	1	0	Position 5
1	1	1	0	Position 6
0	0	0	1	Position 7
1	0	0	1	Position 8
0	1	0	1	Position 9
1	1	0	1	Position 10
0	0	1	1	Position 11
1	0	1	1	Position 12
0	1	1	1	Position 13
1	1	1	1	Position 14 or Autonomous modus

6.3 Automatic modus

By activating the **Auto** column for more than one position (see point 5a in the bellow picture), the autonomous operating modus gets activated. In the autonomic modus the actuator will drive repeatedly between the different positions by considering the delay time after each step. The autonomous modus gets activated by a signal on the four input lines:

IN1	IN2	IN3	IN4	Function
0	0	0	0	Stop
1	1	1	1	Autonomous modus

6.4 Getting started



1. Choose your motor – CASM combination in section **Device** (1a) or choose a previously defined setting in section **Selected** (1b).
2. Define the driving direction in section **Direction of moving**. If you choose **Extracting** the home position will be at a retracted actuator position, if your choice is **Retracting** the home position is located at an extended actuator position.
3. Define the way to home the actuator in section **Home**.
4. Define the deceleration ramp in case of an emergency stop
5. Define the driving positions and the corresponding motion profile in section **Positions** (5a). If your motor includes a break activate the section **Break management** (5b). If the motor does not include a break choose the motor behavior after an emergency STOP or after a MOVE to a defined position (5c).
6. Connect the motor by the programming cable and press **Load to Motor** (6) in section **Selected**.
7. Perform a homing to find the zero position. Now the actuator is ready to use.