EWELLIX

MAKERS IN MOTION

Electric cylinders CEMC

- Compactness
- Lightweight
- Integrated servo motor
- Inverted roller screw technology



Electric cylinders CEMC



Features

- Very compact, fully integrated design
- Inverted roller screw
- Lightweight material
- Highly efficient
- High-resolution position feedback system
- High-speed and acceleration capabilities
- Low maintenance requirements
- High quality components

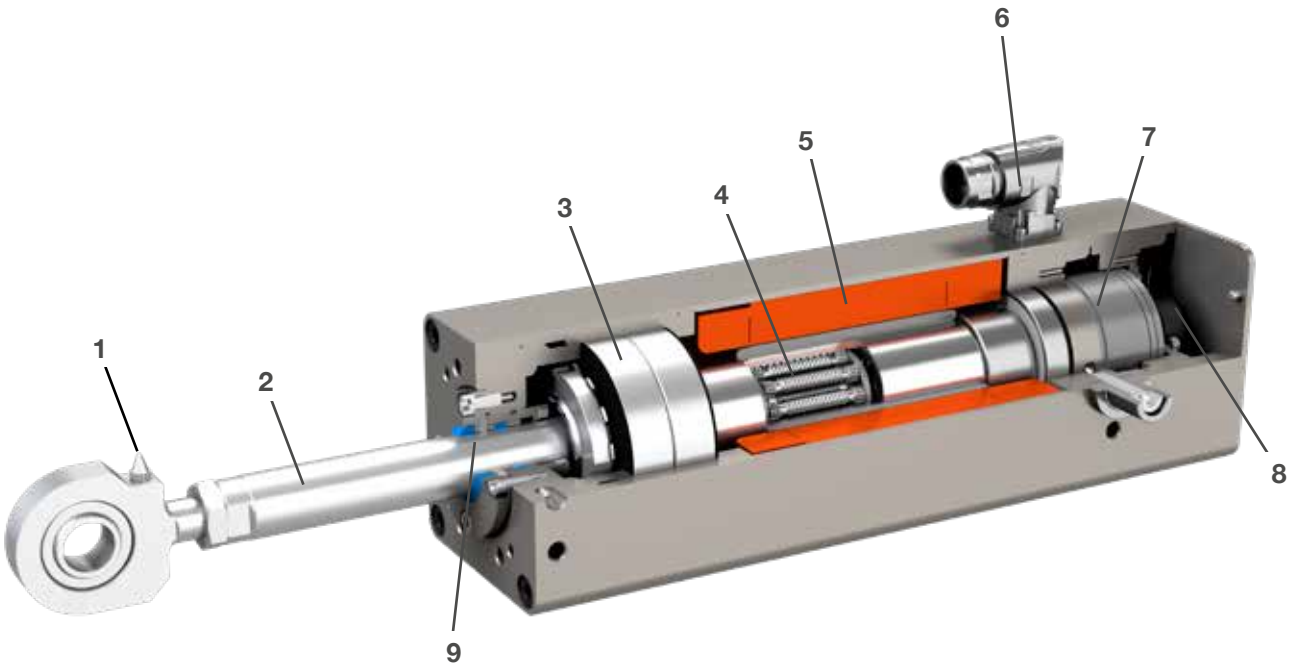
Benefits

- Saves space
- Very high load capabilities compared to actuators with similar dimensions
- Enables for higher acceleration and higher speed of the robot arm
- Reduces energy consumption by 90% compared to pneumatic solutions
- Better quality through greater control of the process
- Faster production cycles
- Low noise

Product description

The CEMC actuators incorporate the planetary inverted roller screw technology that allows integration of hollow shaft motor directly on the roller screw nut, resulting in a very compact yet powerful solution. Besides dimensions, this design also minimize inertia, thus allowing excellent control, responsive performance, significantly improved cycle time, and high productivity.

This product range provides high power density in a small package, with approximately 50% shorter length than any typical electromechanical cylinder. They are an ideal solution when compactness and power density are needed to replace fluid powered cylinders. Moreover there is the added advantage of reduced weight, an important feature for robot arms installations.

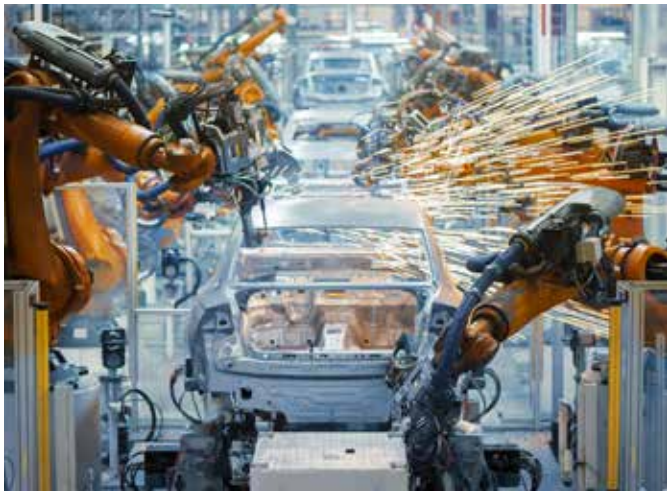


1. Lubrication nipple
2. Push tube
3. High quality angular contact ball bearings
4. High quality planetary inverted roller screw for highest axial load rating, low axial play and high efficiency
5. Integrated hollow shaft servo motor
6. Motor connectors
7. Fail safe brake option
8. Position feedback options for compatibility with main brands of robots/controllers
9. Scraper seal to keep contamination out

Automotive industry

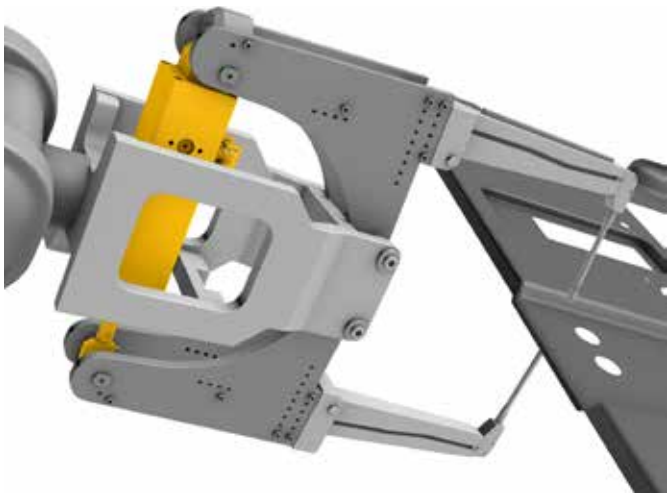
The automotive industry uses a large quantity of industrial robots with an average of 300 welding robots per production line. The CEMC is the best solution to meet the quality standards, performance requirements and energy savings.

With 20 years of automotive experience, the next generation CEMC anticipates future market requirements by offering multiple configurations to fit customer needs and to provide the best performances on the field. Upcoming options such as integrated anti-rotation and embedded IoT-ready sensors will further improve equipment performance and productivity.



CEMC feedback

CEMC next generation is available with different types of position feedback sensors, to ensure the compatibility with main robot and drive manufacturers.



Key benefits for spot welding

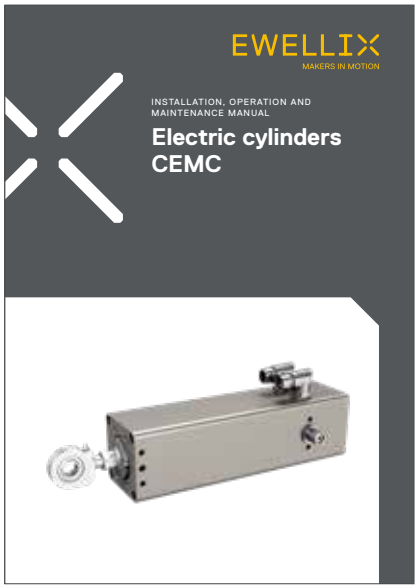
		Value	vs previous generation
	Highest number of welding spots	> 20 million spots	+100 %
KG	Lightweight construction to reduce welding robot power and size	12,5 kg	–10 %
	High reliability to minimize downtime	10 million spots without relubrication	+500 %
	Modularity with various feedback options	336 configurations	Limited feedback options

Manuals

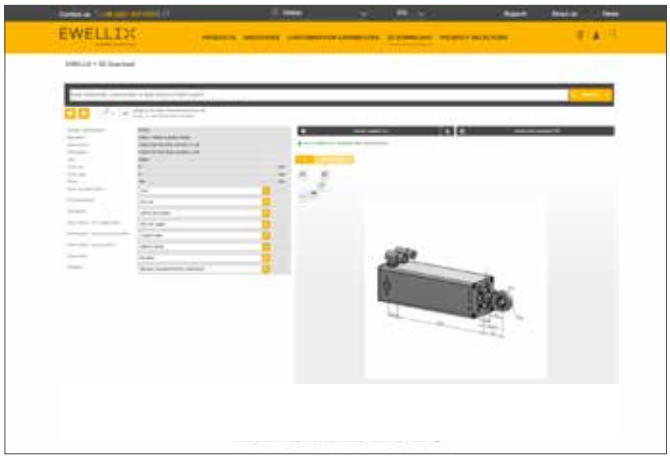
Supporting documents are available for downloading on ewellix.com

3D models

Product configurators for 3D models download are available on ewellix.com



Operating manual



3D model configurator

CEMC-2105

Natural convection cooling



Technical data

Designation	Symbol	Unit	A3N	B3N	A5N	B5N
Performance data						
Continuous force @ zero speed	F_{c0}	kN	6,9	6,8	10,4	10,4
Peak force @ zero speed	F_{p0}	kN	14,0	13,7	25	25
Dynamic load capacity	C	kN	59	59	59	59
Holding force (motorbrake option)	F_{hold}	kN	15,8	15,8	15,8	15,8
Max linear speed	v_{max}	mm/s	300	300	300	300
Max linear acceleration	a_{max}	m/s^2	7	7	7	7
Duty cycle	D	%	100	100	100	100
Mechanical data						
Screw type	–	–	IRS	IRS	IRS	IRS
Screw diameter	d_{screw}	mm	21	21	21	21
Screw lead	p_{screw}	mm	5	5	5	5
Lead accuracy	–	–	G5	G5	G5	G5
Stroke	s	mm	180	180	180	180
Internal overstroke each side	s_0	mm	1	1	1	1
Backlash	$s_{backlash}$	mm	0,04	0,04	0,04	0,04
Gear reduction	i	–	1	1	1	1
Inertia	J	10^{-4} kgm^2	8	8	8	8
Inertia of optional brake	J_{brake}	10^{-4} kgm^2	0,6	0,6	0,6	0,6
Weight	m	kg	11,5	11,5	12,3	12,3
Weight of optional brake	m_{brake}	kg	1,4	1,4	1,4	1,4
Electrical data						
Motor type	–	–	servo	servo	servo	servo
Drive voltage supply (nominal)	U	V_{AC}	400	230	400	230
DC bus voltage supply (minimum)	U	V_{DC}	540	325	540	325
Nominal speed	n_{nom}	rpm	3 600	3 430	3 485	3 600
Max speed	n_{max}	rpm	3 600	3 600	3 600	3 600
Nominal torque @ slow speed[1) 3)]	T_{c0}	Nm	7,8	7,7	11,8	11,8
Nominal current @ slow speed[1) 3)]	I_0	A_{rms}	5,1	8	7,3	12,5
Peak torque @ slow speed[1) 3)]	T_{p0}	Nm	15,9	15,6	28,4	28,4
Peak current @ slow speed[1) 3)]	I_{peak}	A_{rms}	11	17	19	32
Nominal power	P	kW	2,7	2,6	3,9	4,0
Torque constant (K_t at 25 °C)[4)]	K_t	Nm/A_{rms}	1,67	1,06	1,76	1,02
Back emf constant at 1 000 rpm (K_e at 25 °C)[2)]	K_e	V_{rms}	101,0	64,0	106,6	61,7
Winding resistance (at 20 °C)[2)]	R	Ω	4,33	1,74	2,41	0,81
Winding inductance (at 20 °C)[2)]	L	mH	14,97	6	10,01	3,35
Water flow (max pressure 5 bars)	–	l/mn	–	–	–	–
Water temperature	–	°C	–	–	–	–
Pole number	–	–	8	8	8	8
Insulation class	–	–	H	H	H	H
Thermoswitch	–	–	Yes	Yes	Yes	Yes
Temperature sensor	–	–	PT1000	PT1000	PT1000	PT1000
Environment						
Ambient temperature	$T_{ambient}$	°C	0…+40	0…+40	0…+40	0…+40
Degree of protection	IP	–	54S	54S	54S	54S

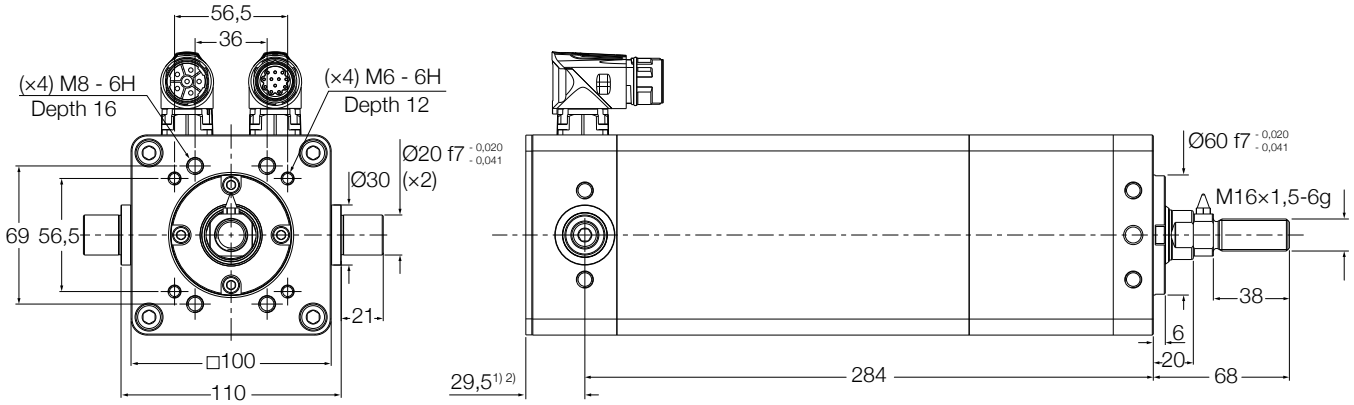
[1)] Slow speed: < 1 % max actuator speed

[2)] Phase to phase

[3)] Values valid for a ΔT of 90 °C

[4)] Tolerance on value: +/–10 %

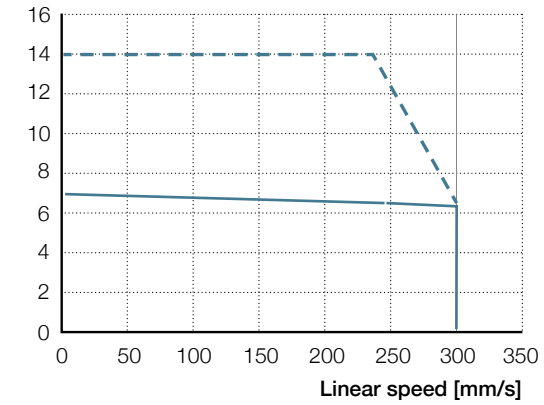
Dimensional drawing



[1] For brake option, add 44 mm
[2] Additional length varies depending on the type of feedback device: for R1 and R2 is 29.5 mm as shown, for S1 add 20 mm and for H1 add 39 mm
NOTE: For other feedback options, please contact Ewellix.

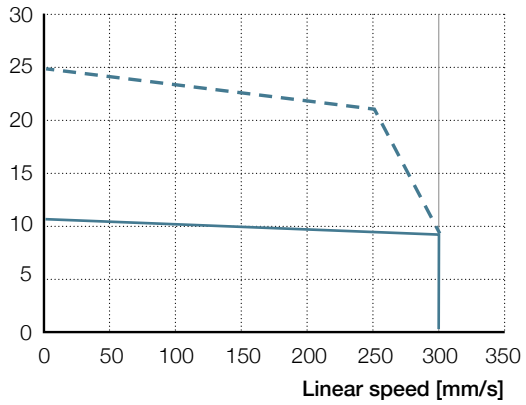
Performance diagrams

×3N Axial force [kN]



F_{cont} F_{peak}

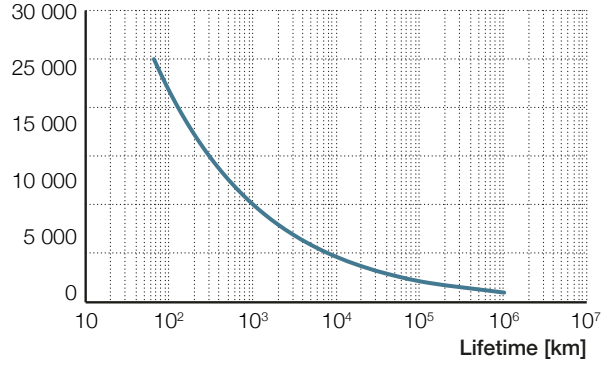
×5N Axial force [kN]



F_{cont} F_{peak}

Lifetime diagram

Fm [N]



NOTE:
This curve shows standard L10 fatigue calculation, with a mean load over a double stroke cycle.
For applications like spot welding or servo press, where a peak force is applied over a very short stroke (shorter than twice the pitch of the roller screw), standard L10 fatigue calculation is not representative of the reachable life in operation. In these cases, please contact Ewellix for a dedicated service life calculation.

Ordering key

See **page 15**

CEMC-2105

Water cooling



Technical data

Designation	Symbol	Unit	A3W	B3W	A5W	B5W
Performance data						
Continuous force @ zero speed	F_{c0}	kN	10,3	10,3	18,2	18,4
Peak force @ zero speed	F_{p0}	kN	20,1	20,1	25	25
Dynamic load capacity	C	kN	59	59	59	59
Holding force (motorbrake option)	F_{hold}	kN	15,8	15,8	15,8	15,8
Max linear speed	v_{max}	mm/s	300	300	300	300
Max linear acceleration	a_{max}	m/s^2	7	7	7	7
Duty cycle	D	%	100	100	100	100
Mechanical data						
Screw type	–	–	IRS	IRS	IRS	IRS
Screw diameter	d_{screw}	mm	21	21	21	21
Screw lead	p_{screw}	mm	5	5	5	5
Lead accuracy	–	–	G5	G5	G5	G5
Stroke	s	mm	180	180	180	180
Internal overstroke each side	s_0	mm	1	1	1	1
Backlash	$s_{backlash}$	mm	0,04	0,04	0,04	0,04
Gear reduction	i	–	1	1	1	1
Inertia	J	10^{-4} kgm^2	8	8	8	8
Inertia of optional brake	J_{brake}	10^{-4} kgm^2	0,6	0,6	0,6	0,6
Weight	m	kg	13,1	13,1	13,9	13,9
Weight of optional brake	m_{brake}	kg	1,4	1,4	1,4	1,4
Electrical data						
Motor type	–	–	servo	servo	servo	servo
Drive voltage supply (nominal)	U	V_{AC}	400	230	400	230
DC bus voltage supply (minimum)	U	V_{DC}	540	325	540	325
Nominal speed	n_{nom}	rpm	3 275	3 110	3 090	3 230
Max speed	n_{max}	rpm	3 600	3 600	3 600	3 600
Nominal torque @ slow speed[1) 3)]	T_{c0}	Nm	11,7	11,7	20,7	20,9
Nominal current @ slow speed[1) 3)]	I_0	A_{rms}	7,8	12,3	13,2	23,1
Peak torque @ slow speed[1) 3)]	T_{p0}	Nm	22,8	22,8	28,4	28,4
Peak current @ slow speed[1) 3)]	I_{peak}	A_{rms}	18	28	19	32
Nominal power	P	kW	4,0	3,8	6,6	7,0
Torque constant (K_t at 25 °C)[4)]	K_t	Nm/A_{rms}	1,67	1,06	1,76	1,02
Back emf constant at 1 000 rpm (K_e at 25 °C)[2)]	K_e	V_{rms}	101,0	64,0	106,6	61,7
Winding resistance (at 20 °C)[2)]	R	Ω	4,33	1,74	2,41	0,81
Winding inductance (at 20 °C)[2)]	L	mH	14,97	6	10,01	3,35
Water flow (max pressure 5 bars)	–	l/mn	2	2	2	2
Water temperature	–	°C	20…30	20…30	20…30	20…30
Pole number	–	–	8	8	8	8
Insulation class	–	–	H	H	H	H
Thermoswitch	–	–	Yes	Yes	Yes	Yes
Temperature sensor	–	–	PT1000	PT1000	PT1000	PT1000
Environment						
Ambient temperature	$T_{ambient}$	°C	0…+40	0…+40	0…+40	0…+40
Degree of protection	IP	–	54S	54S	54S	54S

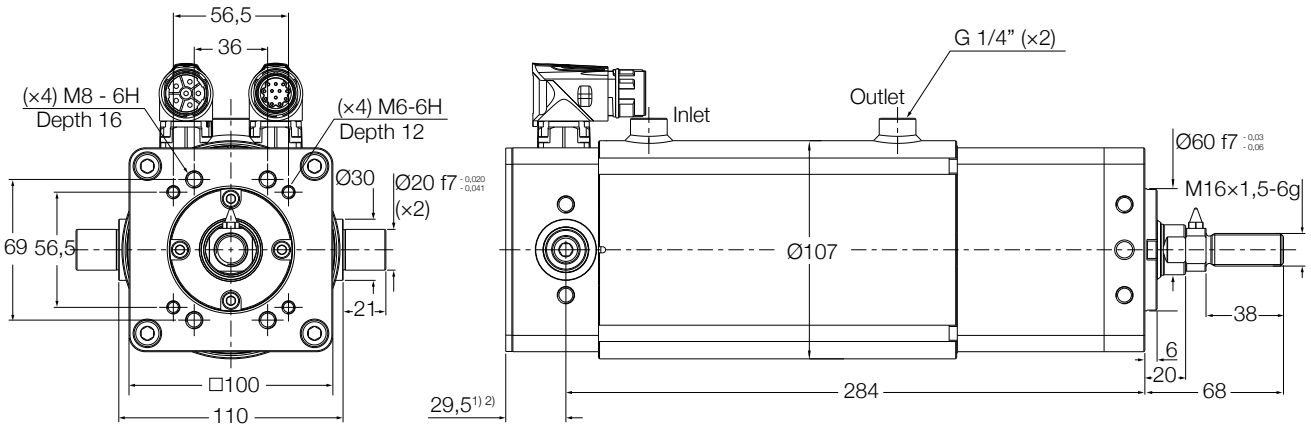
[1)] Slow speed: < 1 % max actuator speed

[2)] Phase to phase

[3)] Values valid for a ΔT of 90 °C

[4)] Tolerance on value: +/– 10 %

Dimensional drawing



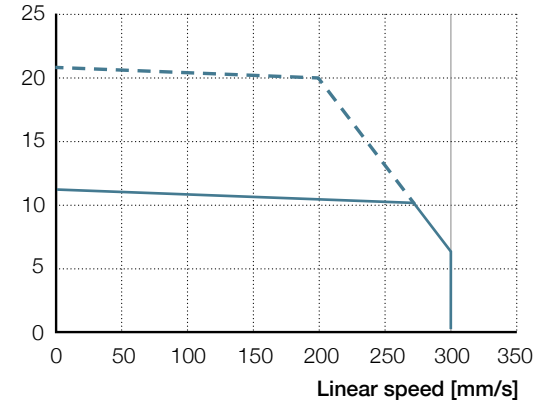
[1] For brake option, add 44 mm

[2] Additional length varies depending on the type of feedback device: for R1 and R2 is 29.5 mm as shown, for S1 add 20 mm and for H1 add 39 mm

NOTE: For other feedback options, please contact Ewellix.

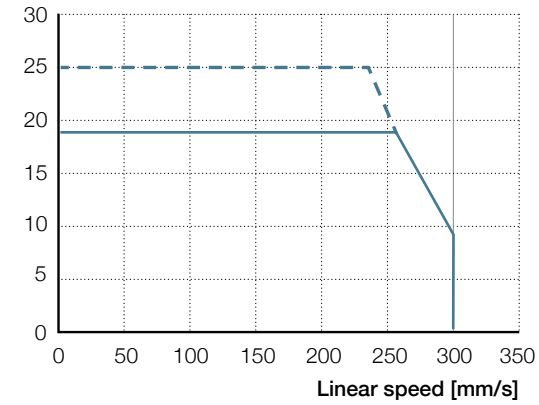
Performance diagrams

×3W Axial force [kN]



F_{cont} F_{peak}

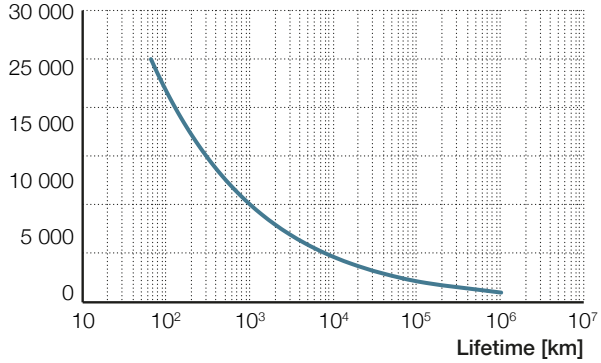
×5W Axial force [kN]



F_{cont} F_{peak}

Lifetime diagram

Fm [N]



NOTE:
This curve shows standard L10 fatigue calculation, with a mean load over a double stroke cycle.
For applications like spot welding or servo press, where a peak force is applied over a very short stroke (shorter than twice the pitch of the roller screw), standard L10 fatigue calculation is not representative of the reachable life in operation. In these cases, please contact Ewellix for a dedicated service life calculation.

Ordering key

See **page 15**

Feedback range on CEMC

Drive compatibility

Robot or drive manufacturer	Resolver Tamagawa (R1)	Resolver LTN (R2)	Absolute encoder Sick-Stegmann (S1)	Absolute encoder Heidenhain (H1)	Absolute encoder Fanuc (F1)	Absolute encoder Yaskawa (Y1)
Lenze (L1)	L1R1	L1R2	L1S1	L1H1	–	–
Siemens (S1)	S1R1	S1R2	S1S1	S1H1	–	–
Kuka (K1)	K1R1	–	–	–	–	–
Comau (C1)	C1R1	–	–	–	–	–
ABB (A1)	–	A1R2	–	–	–	–
Fanuc (F1)	–	–	–	–	F1F1	–
Yaskawa (Y1)	–	–	–	–	–	Y1Y1
Parker (P1)	P1R1	P1R2	P1S1	P1H1	–	–

NOTE: The table above show hardware drive compatibility with Ewellix CEMC.
For other drive manufacturer not listed above, please contact Ewellix.

Feedback list and references

R1	Standard resolver from Tamagawa - Size 15, two pole resolver
R2	Standard resolver from LTN - Size 15, two pole resolver
S1	Multi turn absolute encoder from Sick Stegmann - SKM36 reference, 128 signe/cosine periods per revolution, with Hiperface® protocol interface
H1	Multi turn absolute encoder from Heidenhain - EQN1325 reference, 2048 pulses per turn, with EnDat2.2/01 protocol interface
F1	Multi turn absolute encoder from Fanuc - Alpha iAR128 reference
Y1	Multi turn absolute encoder from Yaskawa

NOTE: for any additional information, please refer to feedback device manufacturer datasheet.

Brake option, technical specification

Permanent magnet brake technology	–	–
Nominal power (at 20 °C)	W	18
Standard supply	VDC	24 (–10 % / +6 %)
Optional supply	VDC	90 (–10 % / +6 %)
Holding torque (at 20 °C)	Nm	9
Holding torque (at 100 °C)	Nm	8
Brake engage/disengage time (typical) *	ms	7/40

[1] The stated switching times are achieved with nominal air gap.
These are average, whose dispersion depends on the power supply and coil temperature.

CEMC connectors definition

Standard power connector, valid for all type of resolver, and S1-H1 encoder



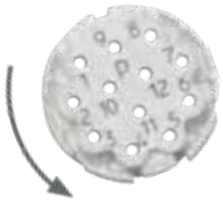
Intercontec BEDC 106 NN 00 00 1216 000

Standard feedback	R1-R2-S1-H1
M23 connector 6 pins	Data/signal
1	U
2	V
3	PE
4	**Brake +**
5	**Brake –**
6	W
Housing	Shield

Optional

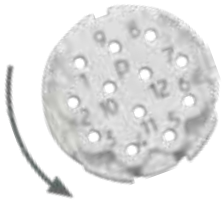
NOTE: For more information, please visit the site: www.intercontec.biz/en.html

Standard feedback connector valid for resolvers, S1 and H1 encoders



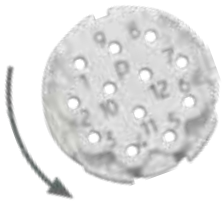
Intercontec AEDC 138 NN 00 00 1215 000 (insert at 20°)

Standard feedback	**R1**
M23 connector 12 pins	Data/signal
1	Sin (S2)
2	Sin (S4)
3	–
4	–
5	–
6	–
7	Err + (R1)
8	PT1000
9	PT1000
10	Err – (R2)
11	Cos (S1)
12	Cos (S3)
Housing	Shield



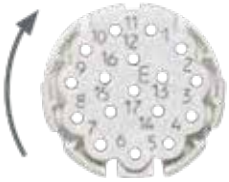
Intercontec AEDC 138 NN 00 00 1215 000 (insert at 20°)

Feedback option	**R2**
M23 connector 12 pins	Data/signal
1	Sin (S2)
2	Sin (S4)
3	–
4	–
5	–
6	–
7	Err + (R1)
8	PT1000
9	PT1000
10	Err – (R2)
11	Cos (S3)
12	Cos (S1)
Housing	Shield



Intercontec AEDC 138 NN 00 00 1215 000 (insert at 20°)

Feedback option	**S1**
M23 connector 12 pins	Data/signal
1	Sin +
2	Sin –
3	VCC (+8V)
4	GND (VCC)
5	–
6	–
7	Datafbk +
8	PT1000
9	PT1000
10	Datafbk –
11	Cos +
12	Cos –
Housing	Shield



Intercontec AEDC 139 NN 00 00 1215 000 (insert at 0°)

Feedback option	**H1**
M23 connector 17 pins	Data/signal
1	Sensor Up
2	–
3	–
4	Sensor 0V
5	PT1000
6	PT1000
7	Up
8	Clock
9	$\overline{\text{Clock}}$
10	0V
11	–
12	B +
13	B –
14	Data
15	A +
16	A –
17	$\overline{\text{Data}}$
Housing	Shield

NOTE:
For F1 (Fanuc encoder) and Y1 (Yaskawa) please contact Ewellix for more information.
For more information, please visit the site: www.intercontec.biz/en.html

Drive options

The performance attributes shown in the tables on the previous pages are the result of a specific Lenze servodrive combinations with the CEMC and integrated Ewellix motor.

The CEMC can be offered with or without the servodrive. The servodrive can be in the recommended configuration or any other configuration that fits your installation with various fieldbus communication for instance (↳ **table 1**).

Standard motors used by Ewellix is powered with 3 × 400VAC drive voltage supply. In consequence standard configurations with Lenze servodrive are with Axx motor type and winding.

Please refer to the ordering key (↳ **page 8** and **9**).

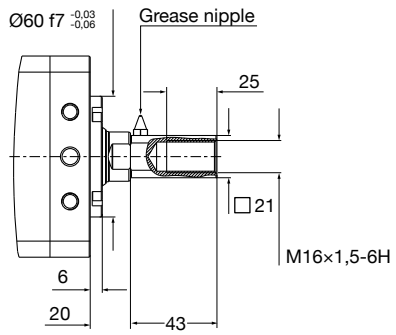
Table **1**

Linear unit	Motor reference	Lenze drive ref.
CEMC2105-180-…	A3N	E94ASHE0074
CEMC2105-180-…	A5N	E94ASHE0134
CEMC2105-180-…	A3W	E94ASHE0134
CEMC2105-180-…	A5W	E94ASHE0174

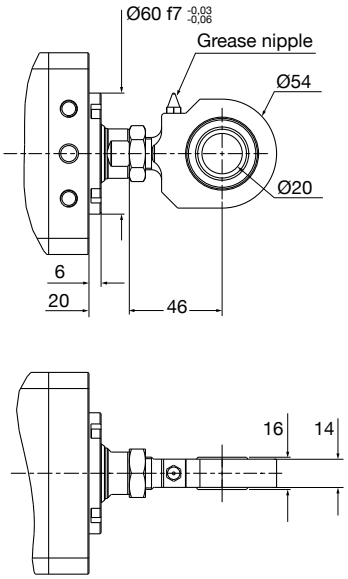
NOTE: Please refer to Lenze documentation for more information. http://www.lenze.come/en-us/products/inverters

Optional front and rear attachment drawings

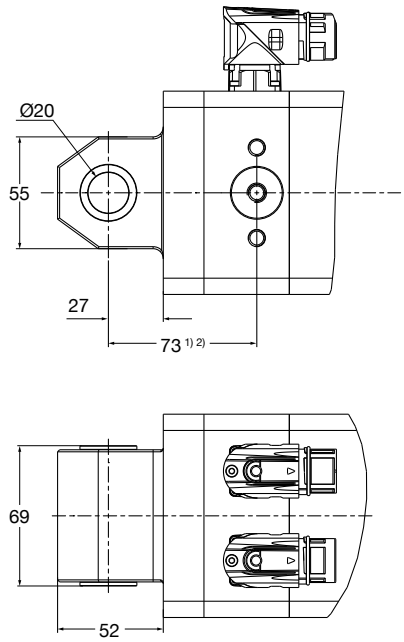
Female thread



Rod end



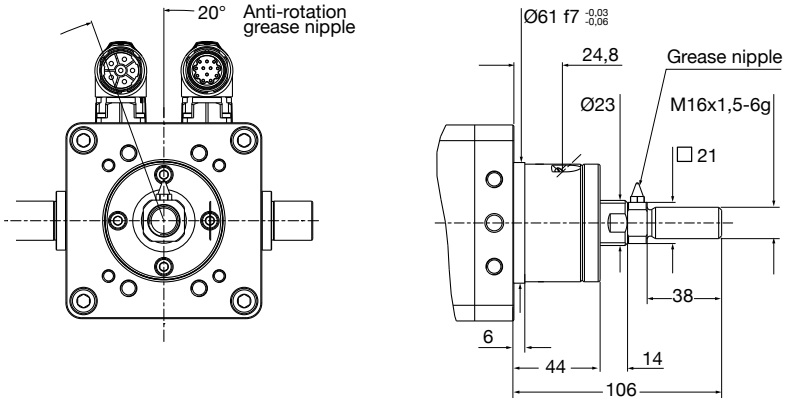
Back clevis



[1] For brake option, add 44 mm
[2] Additional length varies depending on the type of feedback device: for R1, R2 and S1 is 73 mm as shown, and for H1 add 30 mm

NOTE: For other feedback options, please contact Ewellix.

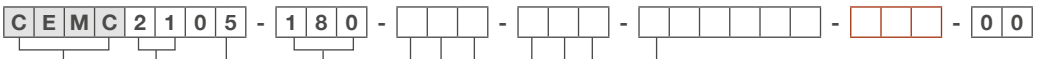
Optional anti-rotation drawing



NOTE: With anti-rotation option, please consider an added weight of 0,7 kg to the linear unit.

Ordering key

Linear units



Type
CEMC

Screw diameter
21 mm

Screw lead
5 mm

Stroke
180 mm

Attachment
Body/rear attachment
- F front
- T trunnions
- B back clevis
- (Z) (customized)

Front attachment
- R rod end
- M male thread
- F female thread
- (Z) (customized)

Anti-rotation
- N without anti-rotation
- A with anti-rotation

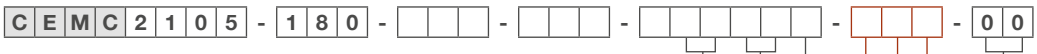
Motor
DC voltage supply
- A 540 VDC
- B 325 VDC[1)]

Number of stacks motor
- 3 3 stacks motor
- 5 5 stacks motor

Cooling option
- N natural cooling
- W water cooling

Brake option
- N no brake
- B standard brake 24 VDC supply
- D brake 90 VDC supply

[1)] Available on request. Please contact Ewellix.



Drive manufacturer and family

L1	Lenze 9400
S1	Siemens Sinamics S120
K1	Kuka
C1	Comau
A1	ABB
F1	Fanuc
Y1	Yaskawa
P1	Parker Compax3

If other drive used, please contact Ewellix for coding

Feedback

R1	Standard resolver (Tamagawa)
R2	Resolver (LTN)
S1	Sick absolute encoder
H1	Heidenhain absolute encoder
F1	Fanuc absolute encoder [1]
Y1	Absolute encoder compliant to Yaskawa specification [1]

Free coding (options)

Motor drive (only valid if L1 selected previously)

Y	Drive included
N	No drive

Power and signal cables

1	5 m
2	10 m
3	15 m
4	20 m
N	no cable

Drive fieldbus

A	CanOpen
B	Devicenet
C	Ethercat
D	Ethernet
E	Powerlink MN/CN
F	Powerlink CN
G	Profibus
H	Profinet
N	No fieldbus

Customization code

For a complete system with Lenze servodrive (valid only with -Axx- motor range), please select options as shown in red in ordering key. If no Lenze servodrive requested, please indicate only -NNN-. See example below.

Example

Linear unit only

CEMC2105-180-TRN-A5N-BA1R2x-NNN-00

Complete system, with actuator + Lenze servodrive:

CEMC2105-180-TRN-A5N-BL1R1x-Y2G-00

[1] Available on request. Please contact Ewellix.

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