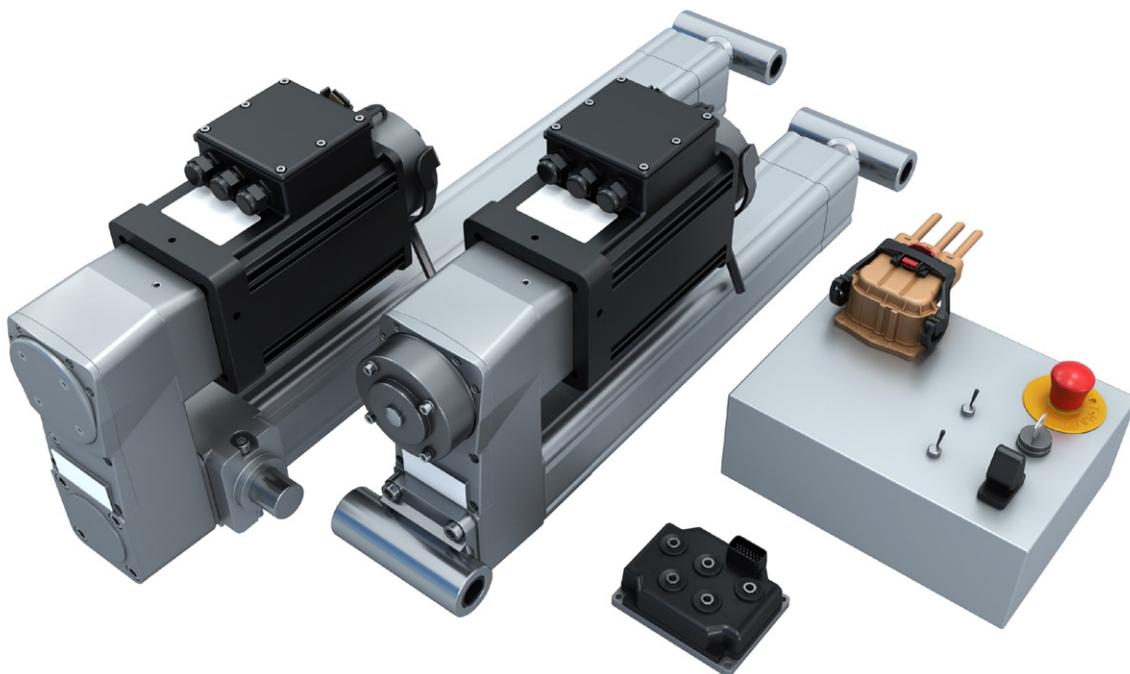


# EWELLIX

A Schaeffler Company

## e-MOVEKIT

Plug-and-play electrification kit for linear movements in mobile machinery



# The heritage of innovation

Ewellix is a global innovator and manufacturer of linear motion and actuation solutions. Our state-of-the-art linear solutions are designed to increase machine performance, maximise uptime, reduce maintenance, improve safety and save energy. We engineer solutions for assembly automation, medical equipment, mobile machinery, distribution and a wide range of other industrial applications.

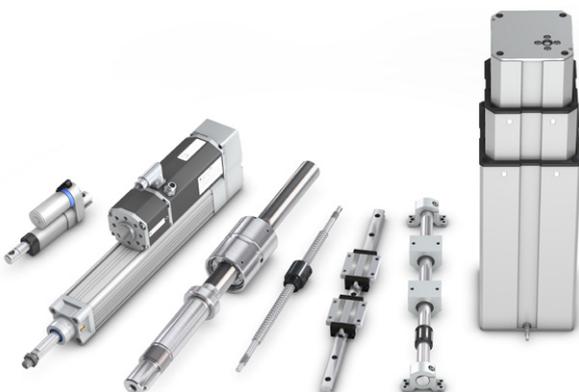
## Technology leadership

We earned our reputation through decades of engineering excellence. Our journey began over 50 years ago as part of the SKF Group, a leading global technology provider. Our history provided us with the expertise to continuously develop new technologies and use them to create cutting edge products that offer our customers a competitive advantage.

In 2019, we became independent and changed our name to Ewellix. We are proud of our heritage. This gives us a unique foundation on which to build an agile business with engineering excellence and innovation as our core strengths.

## Global presence and local support

With our global presence, we are uniquely positioned to deliver standard components and custom-engineered solutions, with full technical and applications support around the world. Our skilled engineers provide total life-cycle support, helping to optimise the design, operation and maintenance of equipment thus improving productivity and reliability while reducing costs. At Ewellix, we don't just provide products; we engineer integrated solutions that help customers realise their ambitions.



## Schaeffler Group – We pioneer motion

Ewellix is since 2023 owned by the Schaeffler Group.

As a leading global supplier to the automotive and industrial sectors, the Schaeffler Group has been driving forward groundbreaking inventions and developments in the fields of motion and mobility for over 75 years.

With innovative technologies, products, and services for electric mobility, CO<sub>2</sub>-efficient drives, Industry 4.0, digitalization, and renewable energies, the company is a reliable partner for making motion and mobility more efficient, intelligent, and sustainable.

Schaeffler manufactures high-precision components and systems for powertrain and chassis applications as well as rolling and plain bearing solutions for a large number of industrial applications.

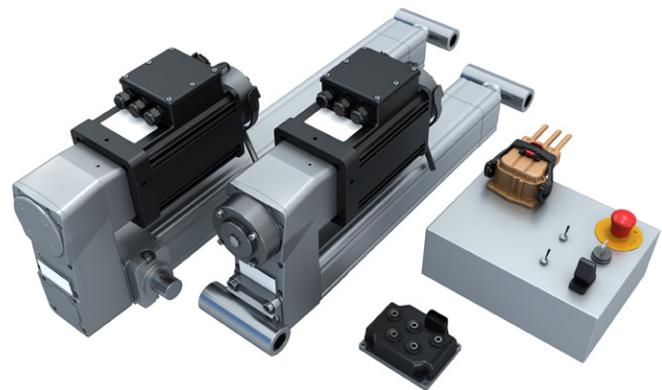


# Plug-and-play electrification kit for linear movements in mobile machinery

The e-MOVEKIT allows users to unlock the benefits of fully electric actuation for their equipment, without the hassle of sizing and designing the complete control system.

Electrification is a macro-trend across all mobile machinery. There are several critical drivers in this industry such as legislation to reduce CO<sub>2</sub> emissions, limits on noise emissions in urban centres, and growing sustainability targets pushing for improved energy efficiency. Ewellix has a clear strategy to support our customers in developing better mobile machines for tomorrow.

Our electromechanical actuators have already replaced hydraulic cylinders in many auxiliary control or steering functions. With improved lifting capacity, increased productivity with more energy efficiency, safety and reliability, linear actuators provide high precision, smooth motion and exceptional stability, together with a lower total cost of ownership which make these solutions increasingly competitive.



A recent survey in mobile machinery showed that over 86% of the industry agrees that electrification is an essential topic in their organisations.

Machine manufacturers recognise that even partial electrification of equipment can potentially deliver high benefits in cost, reliability and operations.

Electromechanical actuators are increasingly becoming alternatives to hydraulic systems that have dominated the mobile machinery sector for decade.

## Key benefits

- Plug-and-play system
- Easy hydraulic system replacement
- Short design and commissioning time
- Quickly build prototypes

## System description

The e-MOVEKIT is a complete system offer that consists of all components required to drive a linear actuator in mobile machines that use 24V batteries. It was tested according to industry standards.

The system allows for linear movements controlled by analog inputs or through CAN commands. It also offers features that make it easy to replace hydraulic systems like:

- Easily integrate the actuator into an existing system
- Start using electromechanics with little knowledge required (system integration e-MOVEKIT, quick start e-MOVEKIT)
- Build prototypes quickly / perform feasibility studies
- Purchase all components from a single supplier
- Get support from one supplier (one stop shop)
- Reduce amount of technical interfaces
- Reduce complexity of the system
- Recuperate energy: battery can be charged by recuperating energy when the system is driven (and not actively driving) e.g., when moving down in a lifting device. This increases overall efficiency and can increase the availability. Alternatively, the customer can reduce the battery size compared to a standard hydraulic system
- Operate the actuator in industries that are sensitive to contamination e.g., food industry, server farms or clean rooms

### Ewellix actuators provide

- High energy efficiency
  - Smooth movement
  - Oil-free solution for less overhaul and maintenance
  - Lower total cost of ownership
  - Increased productivity
- Oil free
  - Reduced maintenance interval and efforts
  - Fully documented performance and environmental testing for mobile requirements
  - The e-MOVEKIT allows users to unlock the benefits of fully electrified actuation for their equipment, without the hassle of sizing and designing the complete control system

## Fluid power replacement benefits



### Simpler system

Electromechanical systems allows for a much smaller system footprint and simplified mechanical layout, reducing the equipment's installation complexity and the commissioning time needed.



### Safety

The force chain through mechanical components offers safety. In case of power loss, actuators can maintain their position and not collapse.



### Control, smooth movement and stability

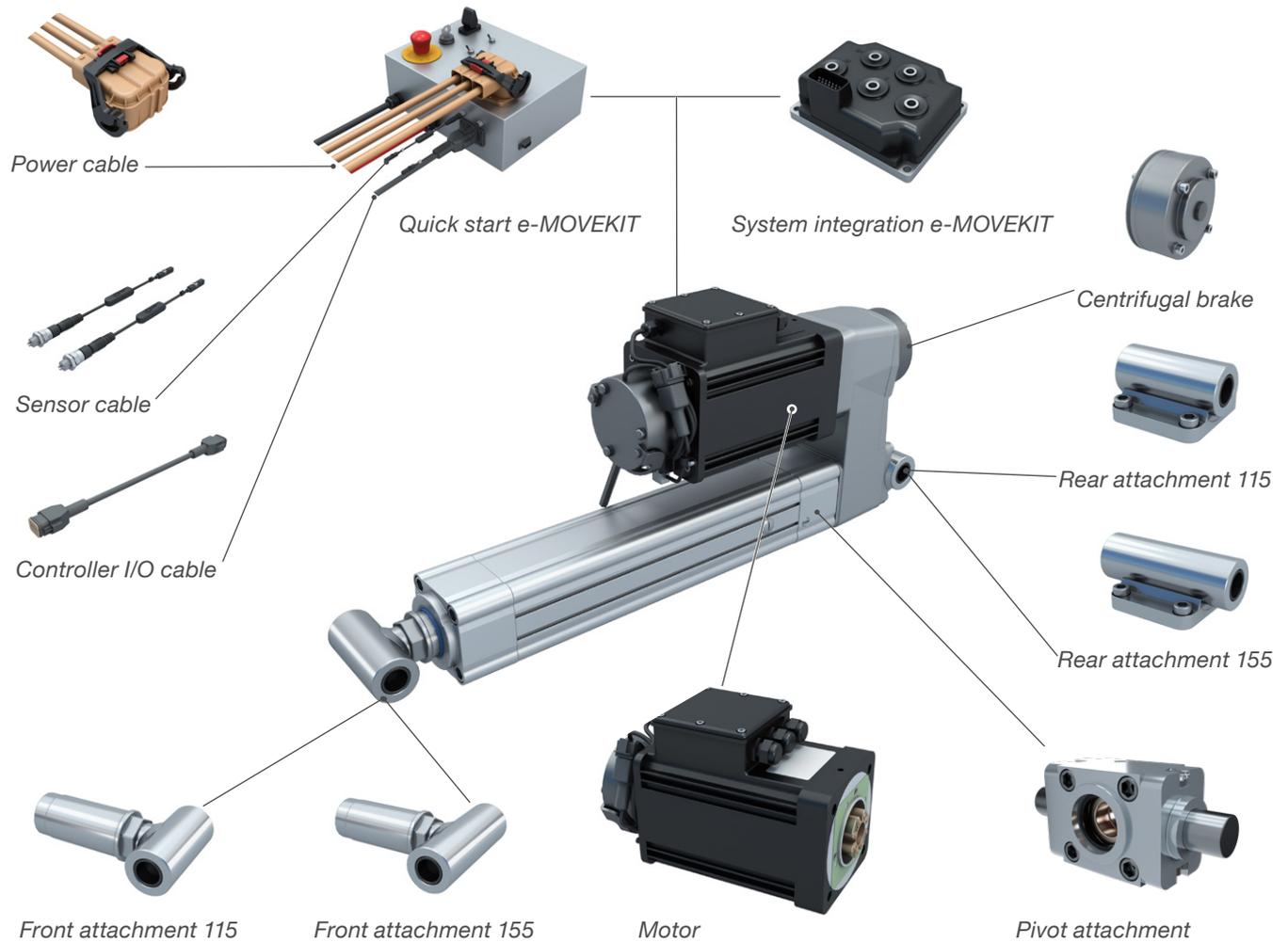
The position, stability and motion are easy to adjust with an electromechanical actuator.



### Energy efficiency

Electromechanical actuators enable efficient operation with their ability to recover energy when the system is backdriving.

The complete actuator solution consists of the modular actuator CASM-100 plus the optional controller e-MOVEKIT.



### Key specifications

Designation	Unit	
Force (push/pull)	kN	60
Stroke	m	up to 2
Max speed	mm/s	100
Nominal voltage	V	24 VDC
Max current	A	200

The complete electronic can be configure here (see **page 46**): [For the mechanical part you need to configure separately:](#)



[CASM-100 datasheet](#)



[Actuator select / Performance calculator](#)

# Application examples

## Aerial work platform

### Scissor lift

Electromechanical actuators are used for lifting and steering functions to increase runtime and productivity of the aerial work platform without leakage risk.



## Material handling

### Forklift

It has become increasingly common to use electrical solutions for lifting, tilting and adjusting the fork and for steering functions on forklift trucks.



## Construction

### Articulated compact dumper

Electromechanical actuators can be used in compact dumpers to steer the vehicle and to dump the bucket.



## Commercial vehicle

### Refuse truck

Electromechanical actuators can power all functions of the truck to completely remove the hydraulic systems onboard.



## Agriculture

### Agricultural robot

The steering and the tools of the autonomous electric machines can be controlled by electromechanical actuators, that can be easily integrated inside the vehicle.



## Control system

To make integration into any system as simple and smooth as possible, Ewellix provides several motor control options. With these controllers we can offer the optimal performance in any application.

### Quick start e-MOVEKIT



The quick start e-MOVEKIT is designed for customers unfamiliar with electromechanical actuators. It comes with all the components needed to start testing straight out of the box, including the motor controller with all the input controls and cables needed to drive the actuator within the application. The quick start e-MOVEKIT is ideal for prototyping and concept studies.

### System integration e-MOVEKIT



The system integration e-MOVEKIT requires a basic knowledge of motor control techniques. The system is already configured with the motor parameters, while the integration into the application is defined by the customer.

With the system integration e-MOVEKIT, Ewellix offers a solution for complete one-handed actuator control.

Both kits can be combined with any of the listed actuator configurations. Ewellix configures all motor parameters according to the selected actuator. Both kits are equipped with Curtis instruments' AC F2-A motor controller.

## Speed mode

By giving a drive command, the controller will drive the motor at the required speed and adjust the power consumption and torque generation accordingly.

For smooth starts and stops an acceleration ramp can be defined to reduce strain on mechanical components and allow for longer life and a high end feel.

## Software features

- CANopen drive commands
- Analog drive commands (FWD/REV or WIG/WAG)
- Limit switch integration possible, standard for the quick start e-MOVEKIT
- Validated safety detection and error prevention:
  - Un-commanded powered motion
  - Motor braking torque loss

# Quick start e-MOVEKIT

The quick start e-MOVEKIT is specially designed to allow easy first prototype integration and build-up of control know-how for electromechanic actuators. The box already contains all necessary components to get started and is truly a plug-and-play solution. The intend of the quick start e-MOVEKIT is to help in the transition from an existing hydraulic system to an all-electric one. The simple and easy to understand control interface allows for fast prototype testing inside the application.

To prevent any damage to the actuator during the first setup and building the know-how about controlling electromechanics actuators inside the application the actuators ordered together with the quick start e-MOVEKIT comes equipped with limit switches that prevent an overtravel into the physical end stops of the actuator.



## Quick start e-MOVEKIT contains:

- Control box
- Motor power cable
- Motor control cable
- Limit switch sensor
- Limit switch extension cable

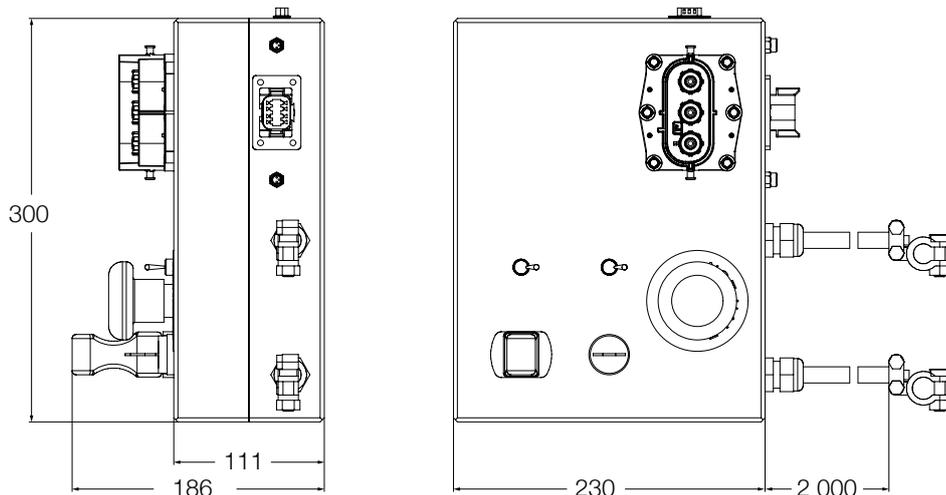
## To be ordered separately:

- CASM-100 linear unit according 'Complete actuator' product configuration including gearbox and motor N11 (see link at page 5)
- Battery 24 V DC (not available from Ewellix)

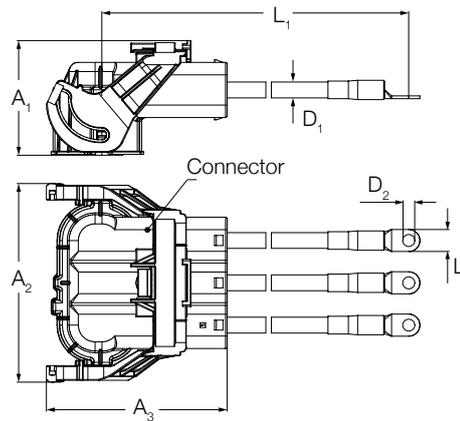
## Performance data

Designation	Symbol	Unit	Data
Controller type	–	–	Curtis AC F2-A-200-051
Interlock	–	–	integrated
Nominal voltage range	–	–	24
Minimum voltage	$U_{min}$	V DC	12
Burnout voltage	$U_{burn}$	V DC	8
Maximum voltage	$U_{max}$	V DC	30
Maximum current [S2-2 min]	$I_{max}$	A RMS	200
Maximum current [S2-60 min]	$I_{max}$	A RMS	67
Designed life	–	–	8 000
Current protection (Fuse)	–	–	250
Environmental rating	IP	–	65/67

## Dimensional drawing

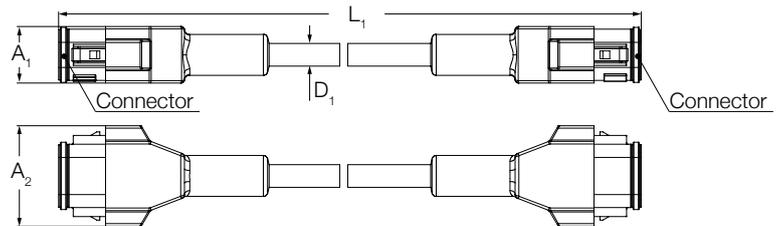


### Motor power cable for quick start e-MOVEKIT



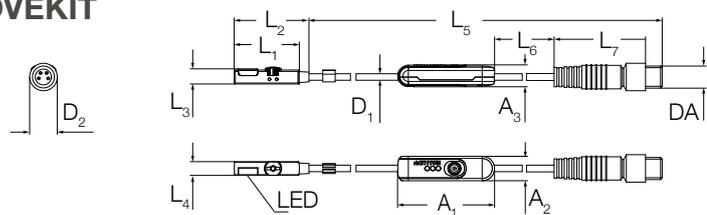
Type	L1	L2	A1	A2	A3	D1	D2	Connector
-	mm							-
ZKA-377946	2 063	12	77	121,9	120	Ø 8,7	Ø 6,5	Ampenol 3 PIN plug right angle HVSL1000 08 3 A 1 25

### Motor control cable for quick start e-MOVEKIT



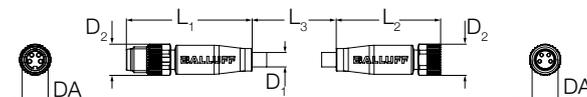
Type	L1	A1	A2	D1	Connector
-	mm				-
ZKA-377945	2 063	22	39	Ø 8,7	Deutsch DT06-08SA

### Proximity switch for quick start e-MOVEKIT



Type	L1	L2	L3	L4	L5	L6	L7	DA	D1	D2	A1	A2	A3
-	mm							-	mm				
ZSC-377942	23,5	27	5,5	5	574	600	33	M8x1	Ø2,4	Ø10	35	8,9	7,9

### Extension cable for proximity switch



Type	L1	L2	L3	DA	D1	D2
-	mm			-		
ZSC-377943	38,8	32,2	2 000	M8x1	Ø4,7	Ø9,7

# System integration e-MOVEKIT

The system integration e-MOVEKIT allows for an integration into any mobile application. The controller comes pre-configured to run with the AC induction motor and allows for a direct integration and gives high flexibility for the integration into any application.

The system integration e-MOVEKIT is targeted for customers that want to realize a product in small series and like to have one single source for all components necessary to control an electromechanical actuator.



## System integration e-MOVEKIT contains:

- Motor controller
- Motor profile pre-setup

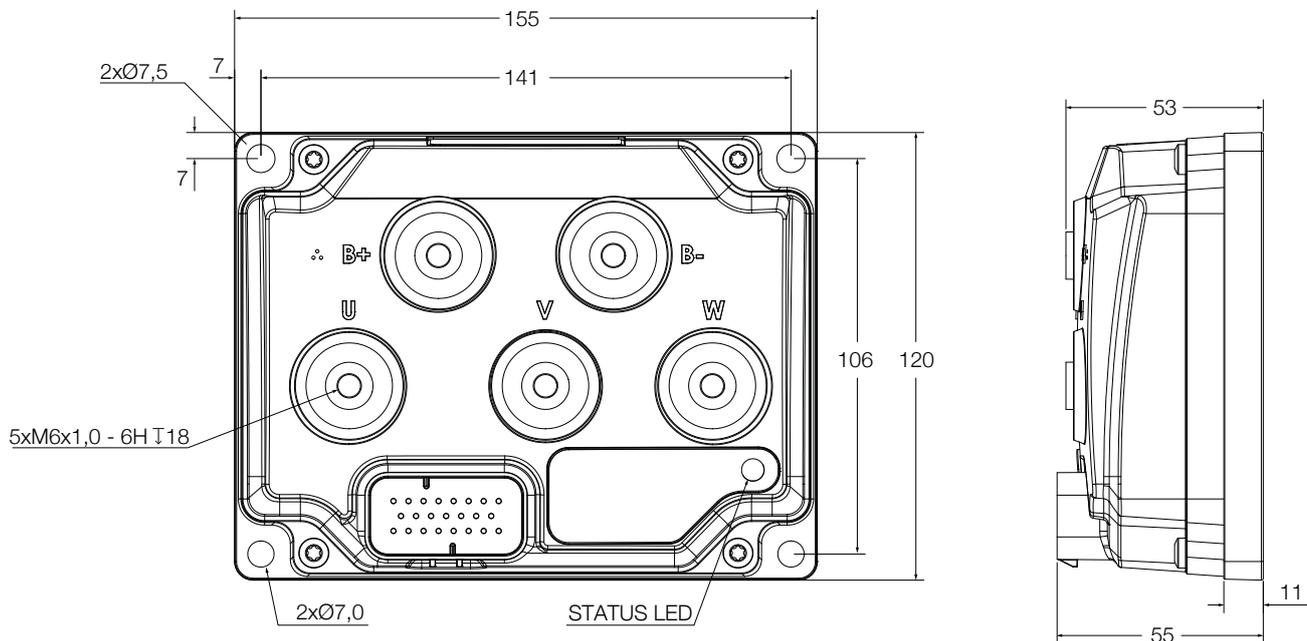
## To be ordered separately:

- CASM-100 linear unit according 'Complete actuator' product configuration including gearbox and motor N11 (see link at page 5)
- Motor power cable
- Motor control cable
- Battery 24 VDC (not available from Ewellix)

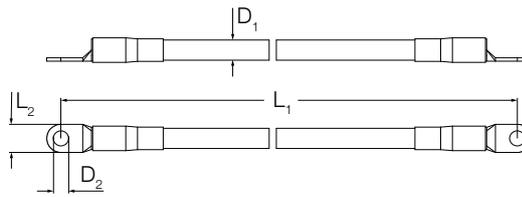
## Performance data

Designation	Symbol	Unit	Data
Controller type	–	–	Curtis AC F2-A 24-200-051
Nominal voltage range	–	–	24
Minimum voltage	$U_{min}$	V DC	12
Burnout voltage	$U_{burn}$	V DC	8
Maximum voltage	$U_{max}$	V DC	30
Maximum current [S2-2 min]	$I_{max}$	A RMS	200
Maximum current [S2-60 min]	$I_{max}$	A RMS	67
Storage ambient temperature	$T_{amb\_stor}$	°C	-40 to +95
Operation ambient temperature	$T_{amb\_op}$	°C	-40 to +50
Designed life	–	–	8 000
Environmental rating	IP	–	65/67

## Dimensional drawing

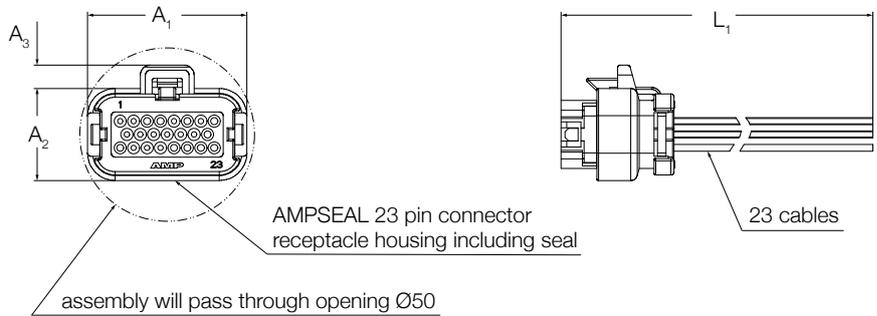


### Motor power cable for system integration e-MOVEKIT



Type	$L_1$	$L_2$	$D_1$	$D_2$
-				
ZKA-377947	2 054	12	Ø 8,7	Ø 6,2

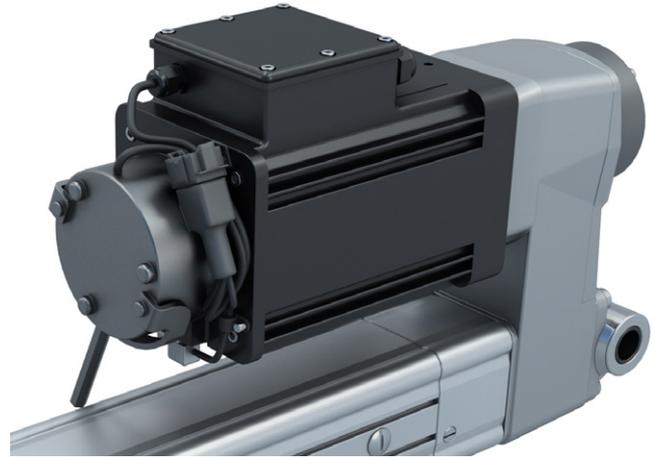
### 23pin AMPSEAL - Pre-assembled connector for I/O to the motor controller



Type	$L_1$ mm	$A_1$	$A_2$	$A_3$
-				
ZKA-377944	1 000	47,4	27,6	7

# AC Induction motor

With this AC induction motor most hydraulic application use cases for mobile machinery can be fulfilled. This motor together with the quick start e-MOVEKIT or the system integration e-MOVEKIT allows for a plug-and-play solution for a wide variety of applications running on 24 VDC battery power. This motor provides high power in a small footprint and was specially designed for the application in linear actuators. The included fail-safe electromagnetic brake allows for a safe operation state in every situation.



## Technical data

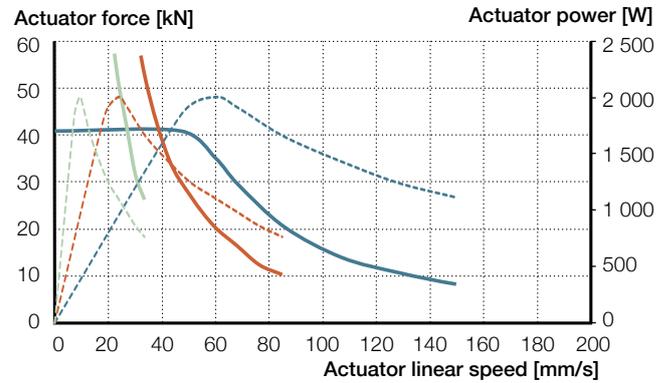
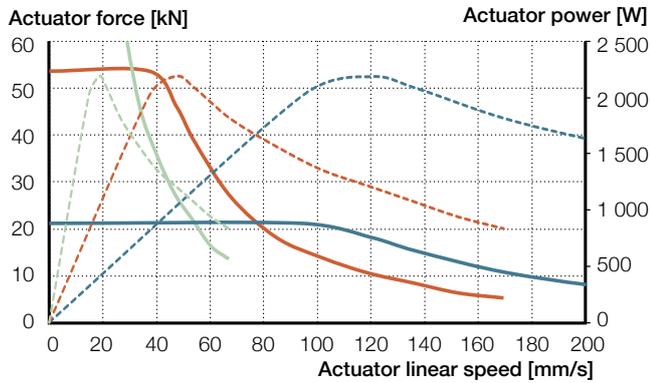
Designation	Symbol	Unit	Data
Typ	-	-	AC induction motor
Rated output power	PM	kW	1.4
Bus voltage	U	V DC	24
Rated voltage	$U_{\text{rated}}$	V AC	16
Rated current	$I_{\text{rated}}$	A	85
Rated speed	$n_{\text{rated}}$	rpm	2 050
Rated torque (S3-15%)	$M_{\text{rated}}$	Nm	6.05
Peak torque (S2-2 min)	$M_{\text{peak}}$	Nm	25
Speed sensor	-	-	2x 64 pulse quadrature encoder
Temperatur sensor	-	-	PT1000
Brake type	-	-	Electromagnetic
Brake voltage level	$U_{\text{brake}}$	V DC	24
Brake power level	$P_{\text{brake}}$	W	25
Manual brake release	-	-	lever

## Performance diagram

### Speed-load diagrams (S2-2 min)

CASM-100-BB/CB

CASM-100-BC

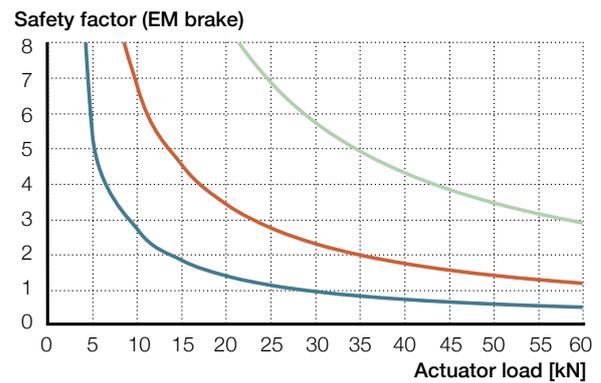
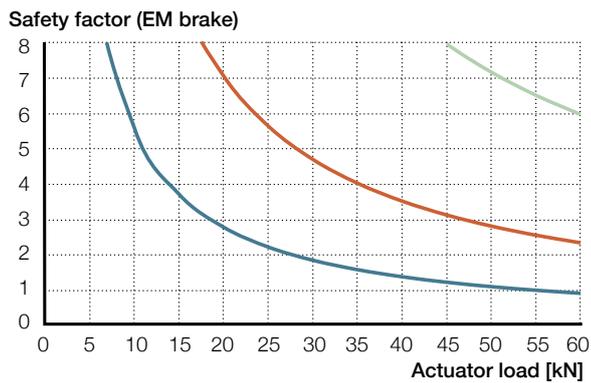


Actuator force	— Gearing ratio 4:1	— Gearing ratio 10:1	— Gearing ratio 25:1
Actuator power	- - Gearing ratio 4:1	- - Gearing ratio 10:1	- - Gearing ratio 25:1

### Safety factor load diagrams

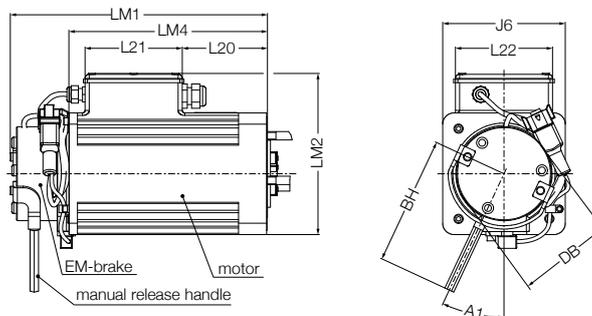
CASM-100-BB/CB

CASM-100-BC



— Gearing ratio 4:1	— Gearing ratio 10:1	— Gearing ratio 25:1
---------------------	----------------------	----------------------

## Dimensional drawing

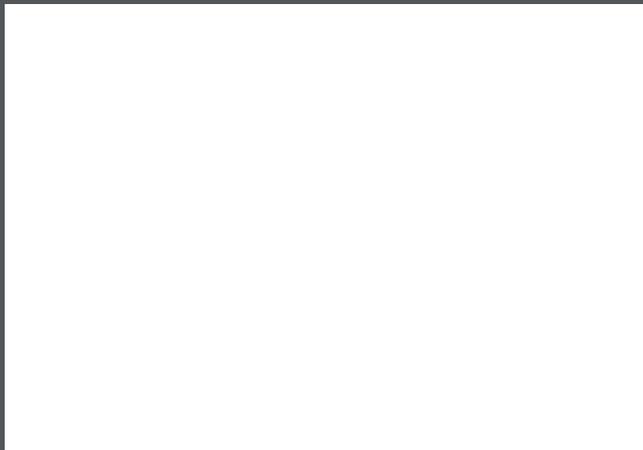


Type	LM1	LM2	LM4	L20	L21	L22	J6	A1	BH	DB
-	mm									
CAM-MA-B0-N11	304,2	192	234,8	100,8	115	□ 115	145	25°	153	∅ 112

# Compliances system integration e-MOVEKIT

Test	Standard
EMC	Designed to the requirements of EN 12895:2015
Safety	Designed to the requirements of EN 1175-1:1998+A1:2010, EN ISO 13849-1:2015 Category 2 Uncommanded powerd motion PL: d Motor braking torque PL: C
Supervision system	<pre> graph LR     Inputs --&gt; P[Primary motor control microprocessor]     P &lt;--&gt;  Monitor  D[Drivers]     P &lt;--&gt;  Monitor  PB[Powerbase]     P &lt;--&gt;  Communication links  S[Supervisor microprocessor]     S -- Shutdown --&gt; PB     D --&gt; Outputs     PB --&gt; M((AC motor))     </pre>
UL	UL recognized component per UL583
Ingress protection	IP65 per IEC60529
Temperature	Controller linearly reduces maximum current limit with an internal heatsink Temperature from 85°C to 95°C; complete cutoff occurs above 95°C and bellow -40°C
Others	RoHS directive 2011/95/EU compliant REACH regulation (EC) No 1907/2006 compliant Dodd Frank Act compliant





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