Operating Manual
Rotary wing actuator PA-KL²-DF(-K)

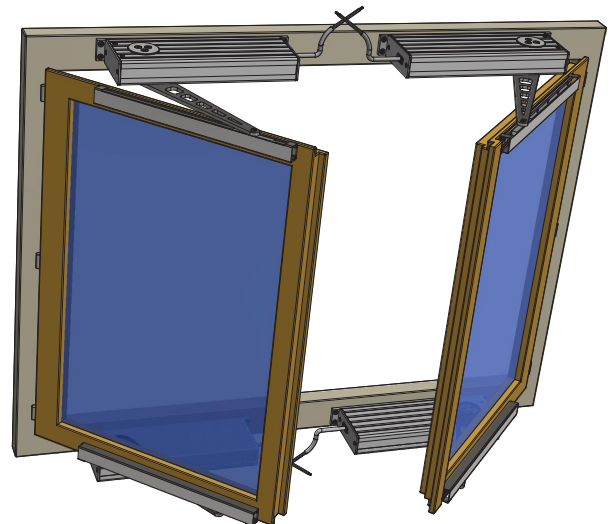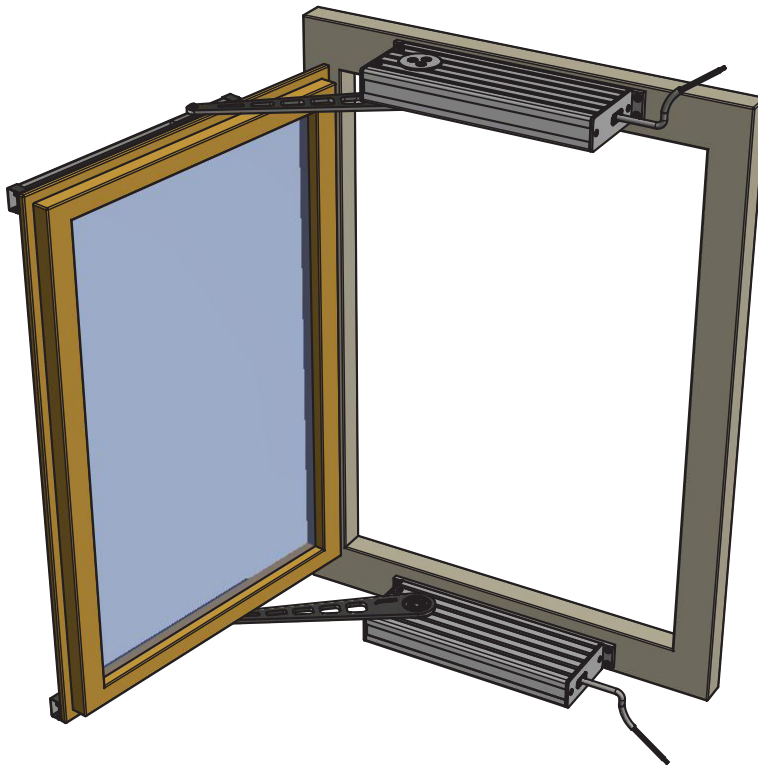**SIMON**
we create fire safety

PA-KL²-DF   PA-KL²-DF-K

24 VDC   DIN EN 12101-2

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ℹ **These operating instructions are only valid with the supplied supplementary sheet „Safety Instructions and Warranty conditions"!**

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1. General

1.1. Figures and Dimensions

Figure 1: Folding Arm² rotary wing – PA-KL²-DF

568
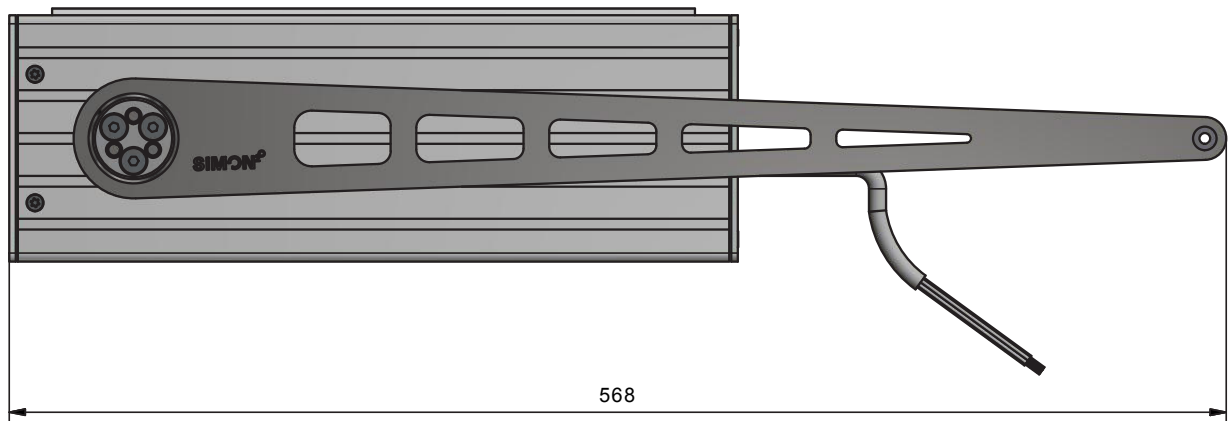
Figure 2: Folding Arm² rotary wing short – PA-KL²-DF-K

118

58

368
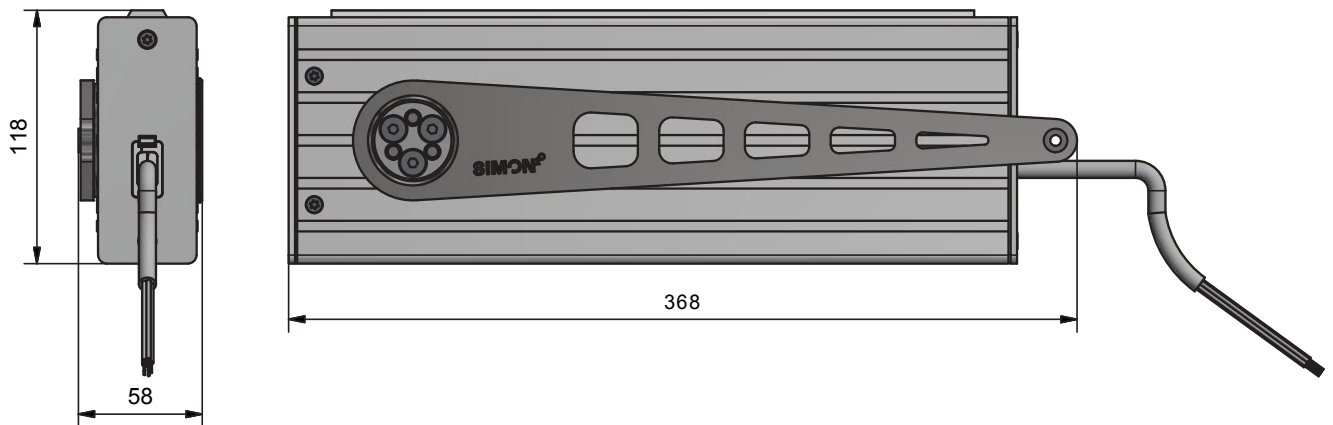
Figure 3: Mounting plate, rail, cover

Mounting plate

40

370

Rail

27

400 / 600 / 800

Cover

31

400 / 600 / 800

Slide
(2-part)

38

80

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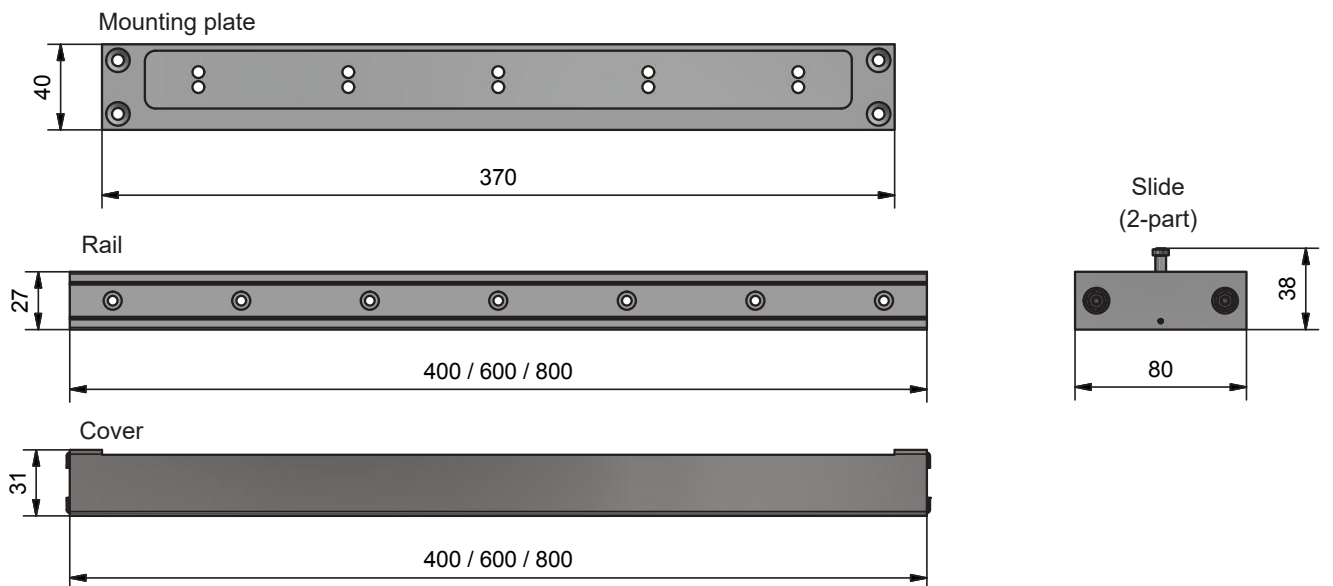
1.2. Assembly situations

1.2.1. Direction of rotation STANDARD
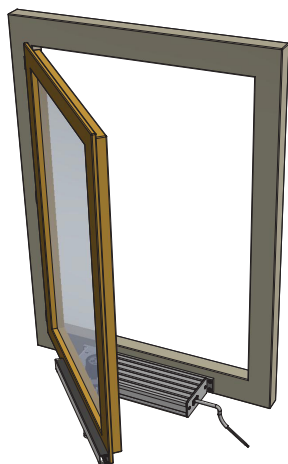
DIN LEFT
INSIDE opening
Actuator BOTTOM
Fastening strip STANDARD
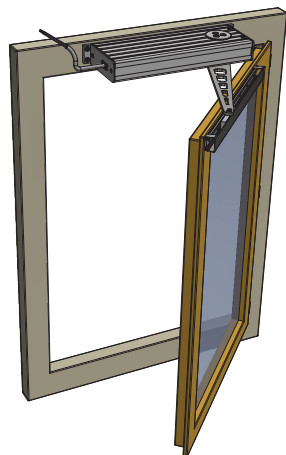
DIN RIGHT
INSIDE opening
Actuator ON TOP
Fastening strip STANDARD
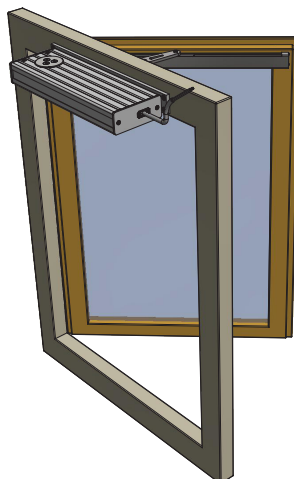
DIN RIGHT
OUTSIDE opening
Actuator ON TOP
Fastening strip ALTERNATIVE
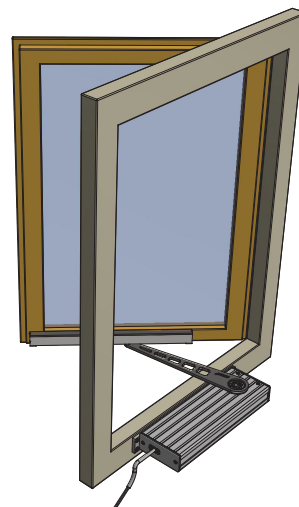
DIN LEFT
OUTSIDE opening
Actuator BOTTOM
Fastening strip ALTERNATIVE

1.2.2. Direction of rotation INVERS
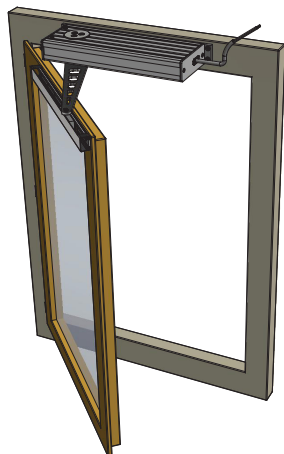
DIN LEFT
INSIDE opening
Actuator ON TOP
Fastening strip ALTERNATIVE
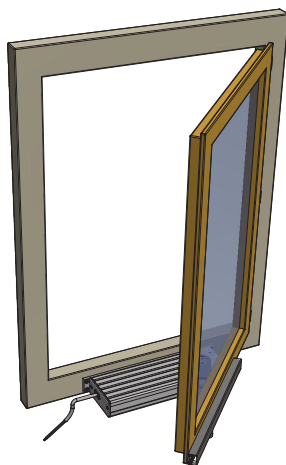
DIN RIGHT
INSIDE opening
Actuator BOTTOM
Fastening strip ALTERNATIVE
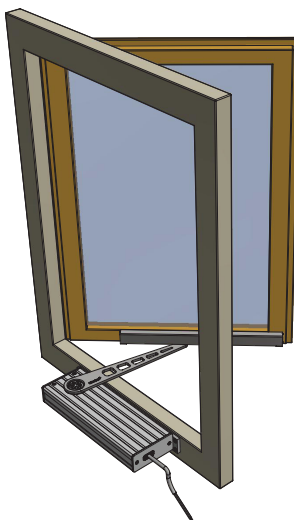
DIN RIGHT
OUTSIDE opening
Actuator BOTTOM
Fastening strip STANDARD
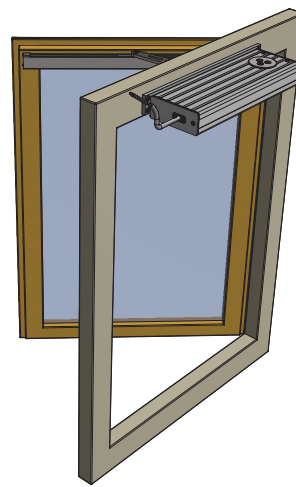
DIN LEFT
OUTSIDE opening
Actuator ON TOP
Fastening strip STANDARD

ℹ INFORMATION

For adjusting the rotation and changing the position of the fastening strip please take care about the instructions, see chapter 3.5 on page 11

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2. Electrical connection

See the attached sheet "**Safety instructions and Warranty conditions**".

2.1. Power supply

The power supply must be designed for the actuator. Voltage and amperage must match the specifications on the label.

2.2. Preparation for installation

Before starting the installation, the required connection cable must be assembled. For this purpose use the plug included in the scope of delivery (see instructions in the accessory bag with SICO PLUG). For NSHEV according to EN 12101-2, the silicone connecting cable approved by the manufacturer must be used.

2.3. Feedback - volt-free contact

The NO contact (NO1, NO2) is activated in direction „CLOSE" when the actuator is switched off in end position „CLOSED".

The signal is stroke-dependent and can be evaluated as „CLOSED signal".

2.4. SICO PLUG assignment

Folding Arm²

S   C1   O   NO1   C2   NO2
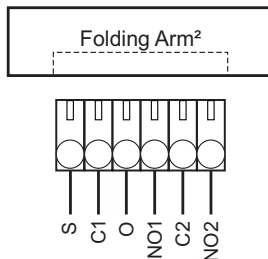
2.5. SICO-PLUG-INSTALL

We recommend the SICO-PLUG-INSTALL kit for a simplified and quick commissioning. Its extended and ergonomically shaped design ensures quick plugging in and unplugging (the connection cable is not included in the kit).

Figure 4
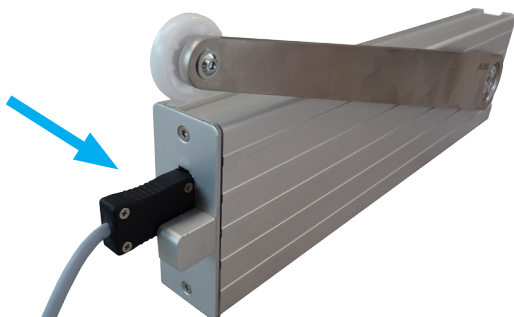
2.6. SICO LINK

The actuator is equipped with a parameterisation interface through which via SICO LINK

- the opening width is set
- the cut-off current in OPEN -/ CLOSE direction setread out
- the start delay OPEN / CLOSE can be adjusted
- the volt-free contact can be set
- MASTER / SLAVE settings can be made
- a detailed status message of the actuator can be read out.

Figure 5: Parameterisation interface SICO LINK
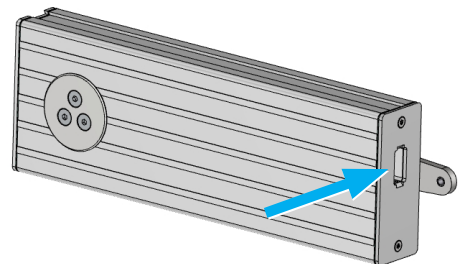
To connect the drive with SICO LINK, the adapter cable SICO-USB-110 is required.

Figure 6: Adapter cable SICO-USB-110

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2.7. SICO operating modes

⚠️ **ATTENTION**

Unused wires must be electrically insulated.

The wires C1 and C2 must not be connected to each other during normal operation.

2.7.1. Single operation

➢ Connect wires according to the wiring diagram.
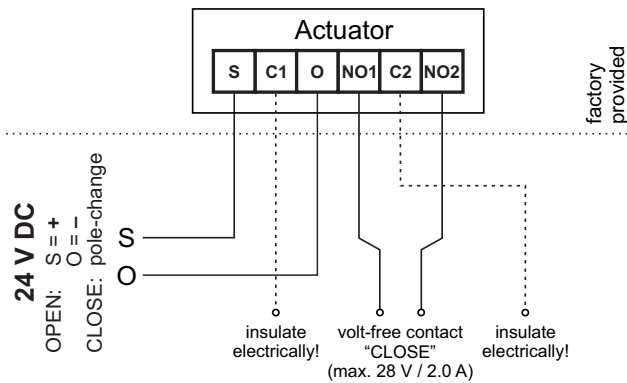
2.7.2. Synchronous operation

⚠️ **ATTENTION**

Only for actuators mounted together on the same wing.

➢ Connect wires according to the wiring diagram.

$$I_{total} = n \times I_{max}$$
$$n \leq 4$$

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2.8. Setting options

You can set **single operation** or **synchronous operation mode MASTER/SLAVE** via SICO LINK or manually (see chapter 2.9).

Figure 7: Stroke behaviour
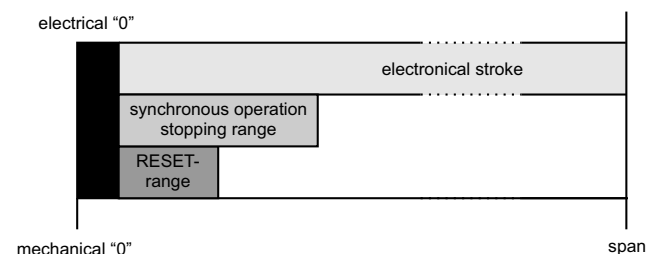
Actuator type	Folding Arm² rotary wing PA-KL²-DF-K	Folding Arm² rotary wing PA-KL²-DF
RESET-range	3 deg	3 deg
Synchronous operat. stopping range	6 deg	6 deg

RESET-range: When the actuator is cut off by overload within the RESET-range, the electrical „0" point will be set new.

Synchronous operation stopping range: If an actuator cuts off in synchronous operation in direction CLOSE within the **stopping range**, the remaining actuators continue to run to the zero point until overload cut-off.

2.8.1. Synchronous actuators

The synchronous actuators of the PA-KL² series are identified by the suffix "S" in the part number.

Example: PA-KL²-DF-50/140deg-S – M2 XXXX S

2.8.2. Operating modes synchronous actuator

If a synchronous actuator is to be used as a single actuator, the operating mode must be set to "Single operation" (SICO LINK or RESET-run) – factory setting.

If several actuators are to be used in synchronous operation, one actuator must be set to "Synchro Master" and the remaining actuators to "Slave" (SICO LINK or manual MASTER/SLAVE setting).

> ⚠️ **ATTENTION**
>
> Only actuators with the same status / (IS position) may be synchronized, ideally when closed.
>
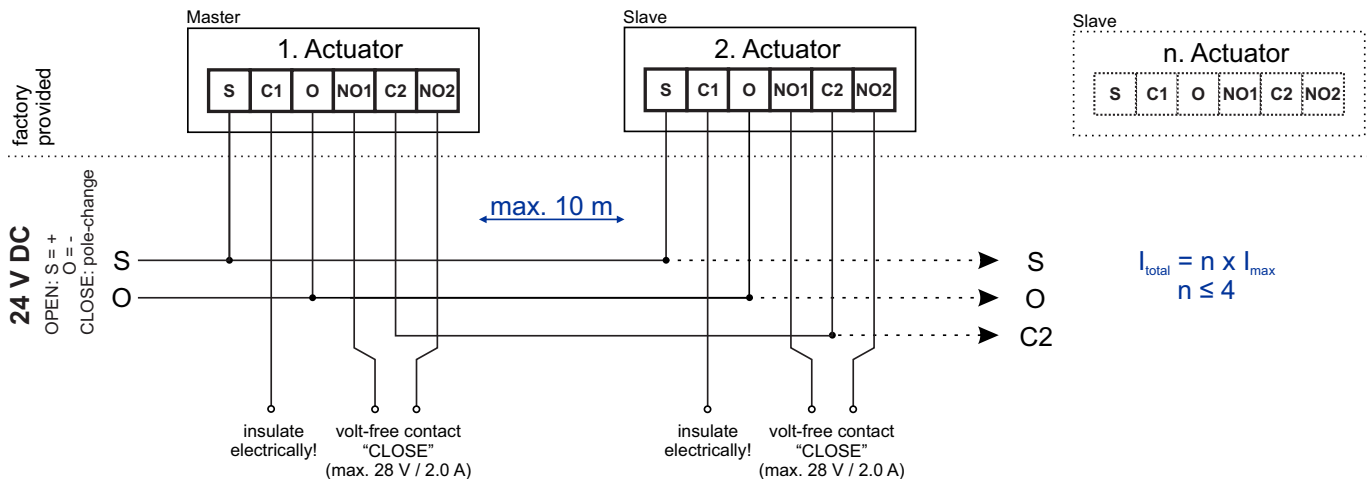> In order to recalibrate the synchronous function, the actuator must be fully closed in the reset range after respectively max. 50 cycles.

2.9. Manual setting

2.9.1. MASTER/SLAVE setting

> ⚠️ **ATTENTION**
>
> **Manual setting:** One MASTER and one SLAVE possible.
>
> **SICO LINK**: ONE MASTER and up to four SLAVEs possible.

➢ Drive the actuator in direction "CLOSE" (**S**="**–**" **O**="**+**") and let it cut off in the end position. If the actuator does not reach the „mechanical ZERO" position due to its mounting position, a RESET-run must be performed.

➢ Leave the actuator energized!

➢ Connect the wires **C1** and **C2** directly. A relay click can be heard.

  ◆ After 5 seconds you can hear a relay click, the actuator is set to MASTER with one connected SLAVE. Separate wires.

  ◆ After 10 seconds a further relay click can be heard, the actuator is now set to SLAVE. Separate wires.

➢ Disconnect the actuator from power supply!

➢ Connect the two actuators according to chapter 2.7.2: „Synchronous operation" on page 6 .

2.9.2. RESET-run

A RESET-run should be carried out,

● if the opening width of the closed actuator at the window is outside the RESET-range.

● if the MASTER/SLAVE setting needs to be reset.

➢ Disconnect the actuator(s) from power supply!

➢ Connect the wires **C1** and **C2** of each actuator directly with each other.

➢ Drive each actuator in direction "CLOSE" (**S**="**–**" **O**="**+**") and let it be cut-off in the end position!

➢ Again disconnect the actuator(s) from power supply and disconnect the wires **C1** and **C2**!

↳ The zero point is set.

↳ In case of "synchro capable" actuators, the operating mode is reset to "single operation" by the RESET-run. In this mode, the actuators can be operated standalone.

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3. Mounting

⚠️ **ATTENTION**

All dimensions given in this chapter are minimum specifications and may vary depending on the type and shape of the windows

3.1. Single installation
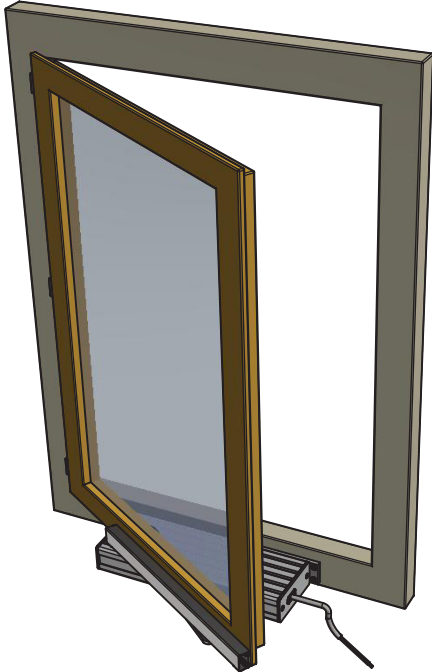
Figure 8: Installation sequence Single

1. Determine **mounting position**
2. **Prepare actuator**
   - direction of rotation
   - fastening strip
3. Mount **rail**
4. Install **mounting plate** and **actuator**
5. Mount **slide**
6. Perform **RESET-run & TEST-run**
7. Mount **cover**
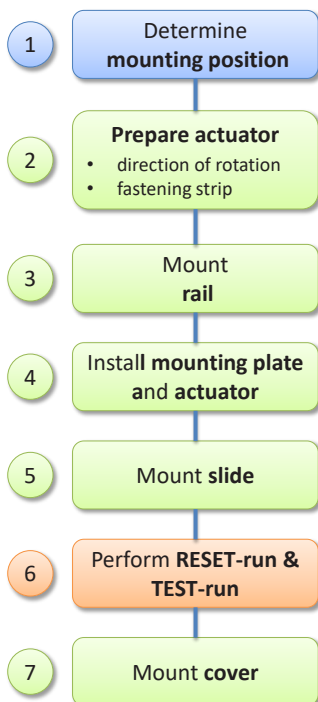
3.2. Synchronous installation

Figure 9: Installation sequence Synchronous

- Install **first actuator** such as **SINGLE** installation **(do not mount the cover yet)**
- **Open slightly the first actuator** and disconnect slide and actuator
- Install **second actuator** such as **SINGLE** installation
- Move the second actuator to approximately the same position as the first.
- Mount the **first slide** again
- Close **both actuators**
- Set **Master & Slave**
- Connect BUS line „C2" & carry out a **test run**
- Mount **covers**

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3.3.   Second sash installation

Side wing
(inward second sash)
Startup "Open delay"

Main wing
(outward second sash)
Startup "Close delay"

No synchronous operation!

SICO LINK

INFORMATION

For mounting on a second sash, start-up delays must be set in all actuators via SICO LINK.

Figure 10: Installation sequence SECOND SASH installation

Install **main wing** such as **single operation / synchronous operation**

Install **secondary wing** such as **single operation / synchronous operation**

Set **secondary wing** start-up „Open delay" / set **main wing** start-up „Close delay" & Carry out **test run**

Install **cover**

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3.4. Determine mounting position

1 → Determine **mounting position**

Prepare actuator
- direction of rotation
- fastening strip

ℹ INFORMATION

Due to different protrusions of the sash to the frame, small deviations may occur. The following figures are exemplary.

The maximum possible sash dimensions depend on several parameters and must be defined before installation of the actuator in case of doubt. External influencing factors, such as wind loads and sash weight, may play a significant role in this case.

Figure 11: PA-KL²-DF — opening inward

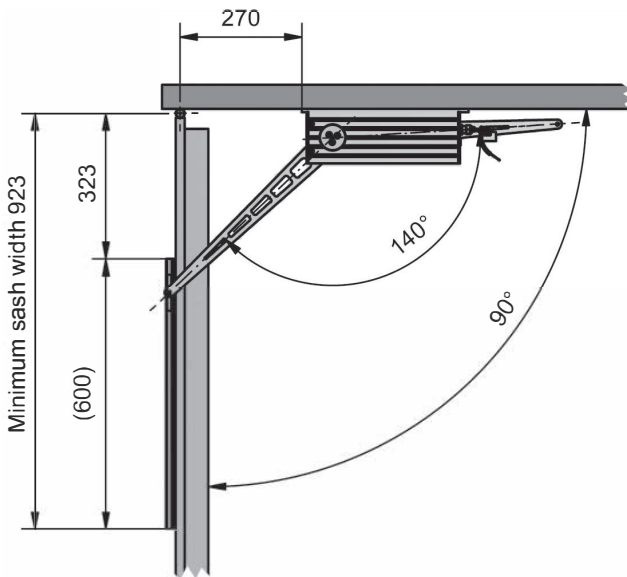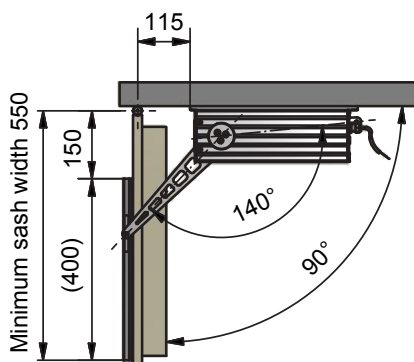**Figure 12: PA-KL²-DF-K — opening inward**
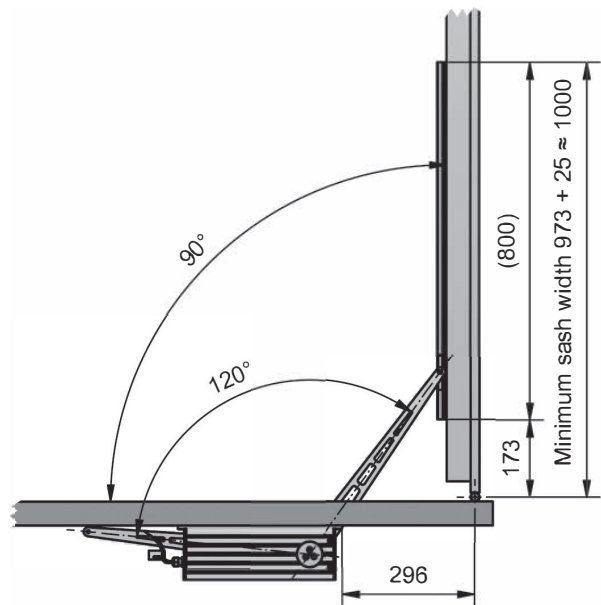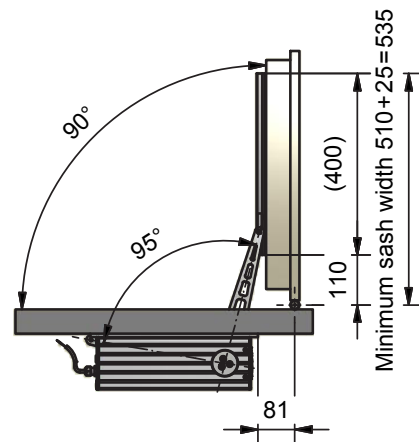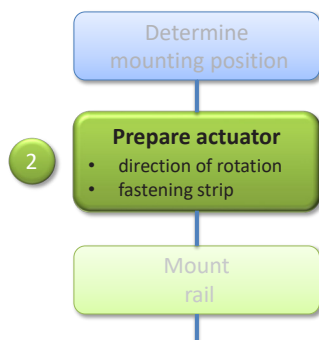

Figure 13: PA-KL²-DF — opening outward

Figure 14: PA-KL²-DF-K — opening outward

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3.5. Prepare the actuator
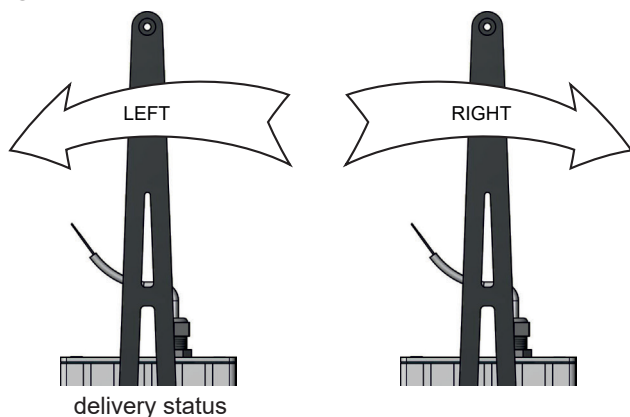

3.5.1. Adjust the direction of rotation

The actuator PA-KL²-DF(-K) can be used flexibly with regard to the installation situation and direction of rotation.

In "OPEN" (default: "LEFT") direction, the actuator stops automatically, starting from its 0-point, after reaching the set maximum stroke.

In "CLOSE" (default: "RIGHT") direction, the actuator always stops due to overload cut-off after reaching the set SOFT-CLOSE current.

To facilitate installation, you can adjust the direction of rotation even when the unit is not mounted.

Figure 15: Direction of rotation

delivery status

3.5.1.a. Direction of rotation change

The direction of rotation can be changed via the SICO LINK as well as manually.

Without the use of SICO LINK, the direction of rotation can be changed as follows:

➢ Connect wires C1 and C2 with each other.

➢ Supply the actuator with power so that it drives in the "CLOSE" direction to be set.

➢ Let the actuator drive briefly in the new "CLOSE" direction. Then stop the actuator.

↘ Starting from the driven "CLOSE" direction, the actuator has now saved its direction of rotation.

➢ Disconnect and insulate the wires C1 and C2 again.

3.5.2. Change the fastening strip to the opposite side

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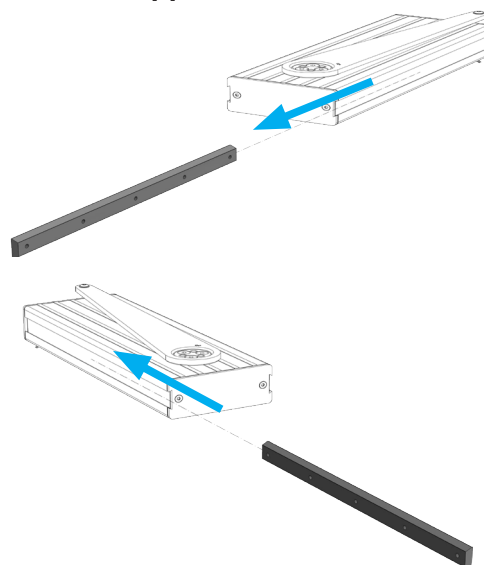
3.6. Mount rail
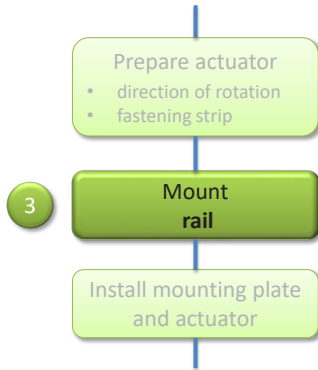
ATTENTION

Make sure that the screw heads do not protrude and ensure unhindered running of the slide.

Figure 16

Mount the running rail **parallel** to the edge of the sash

Figure 17

opening outward at least 12 mm
opening inward 0 mm
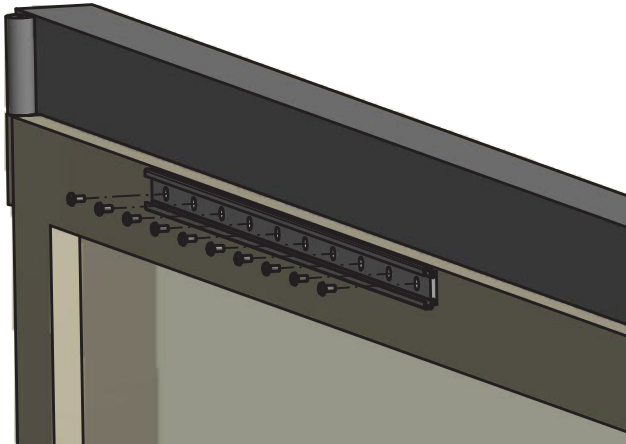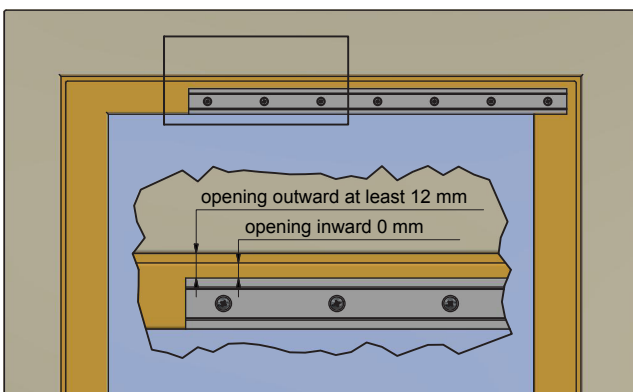
3.7. Mount actuator
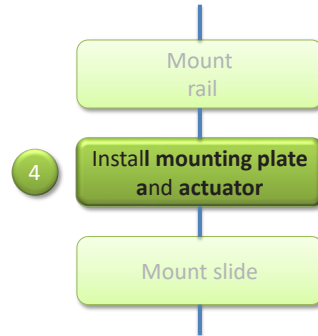
Figure 18: Mounting plate — opening inward

Tighten screws with 4 Nm
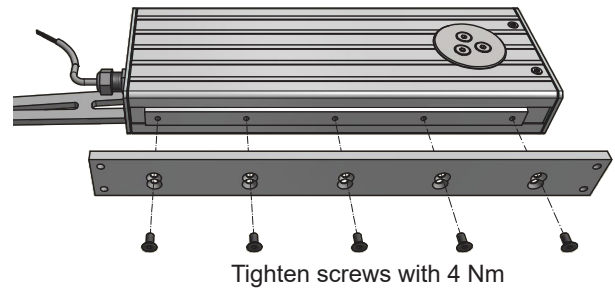
Mount the mounting plate centered to the actuator

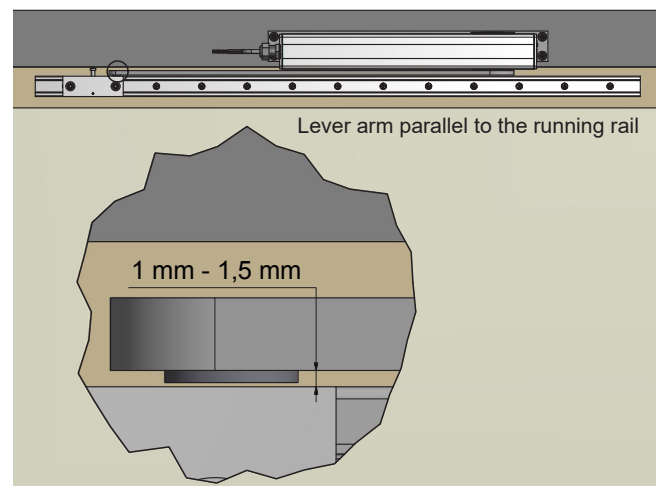**Figure 19: Mounting plate — opening inward**

Mount the mounting plate **offset** from the lever arm

Figure 20: Install actuator

Lever arm parallel to the running rail

1 mm - 1,5 mm

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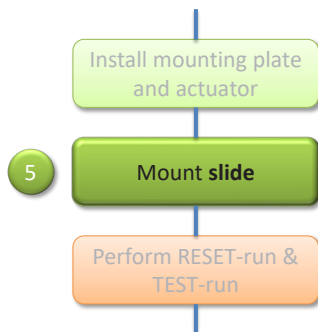
3.8. Mount slide

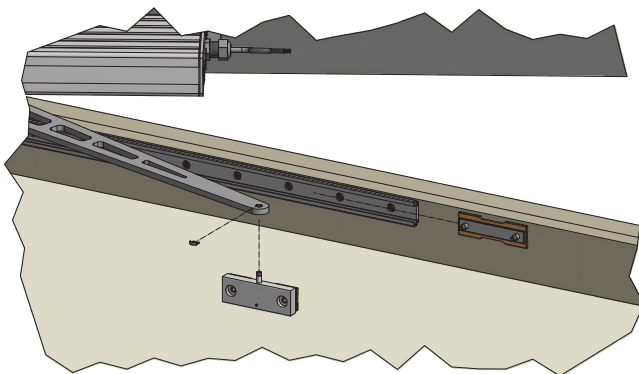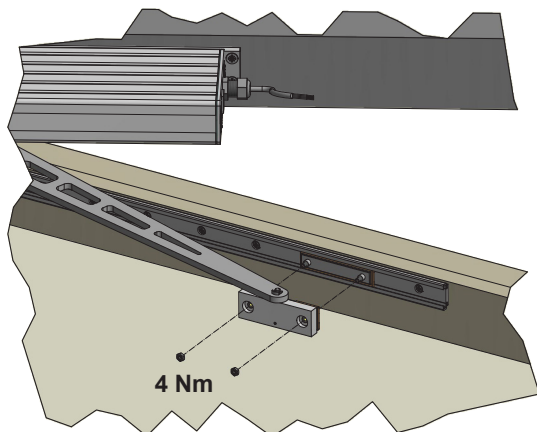

Figure 21: Insert slide

Figure 22: Fastining slide

4 Nm

3.9. Perform a RESET-run

3.9.1. RESET-run SINGLE operation

➢ After mounting and connecting the actuator to the slide, make sure that the window is slightly open. Then connect the **C1** and **C2** wires.

➢ Supply the actuator with 24 V DC via the wires **S** and **O**, so that it drives into **"CLOSE"** direction (window / flap closes).

➢ While the actuator is driving in "CLOSE" direction, you can disconnect the **C1** and **C2** wires.

➢ Let the actuator drive completely into end position **"CLOSE"** and let it be switched off by overload, when the window is closed.

↳ The direction of rotation is now set correctly

↳ The actuator has set a new zero point in the end position.

➢ You can now finally connect the actuator to the control unit (see chapter 2.7.1: „Single operation" on page 6).

3.9.2. RESET-run Synchronous operation

⚠️ **ATTENTION**

In order to prevent damage to the window and to the actuators, perform the RESET-run in the synchron case individually, as with two SINGLE actuators.

➢ Connect the first actuator to the window via the slide and perform a RESET-run as described above.

➢ Now disconnect the first actuator from the window again and connect the second actuator to the window.

➢ Perform a RESET-run for the second actuator as described above.

➢ After the RESET-run of the actuators reconnect both with the slides and close the window.

➢ Subsequently, both actuators are to be parameterised as **MASTER** and **SLAVE** (see chapter 2.8.1: „Synchronous actuators" on page 7).

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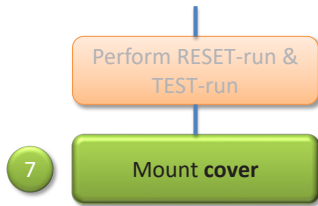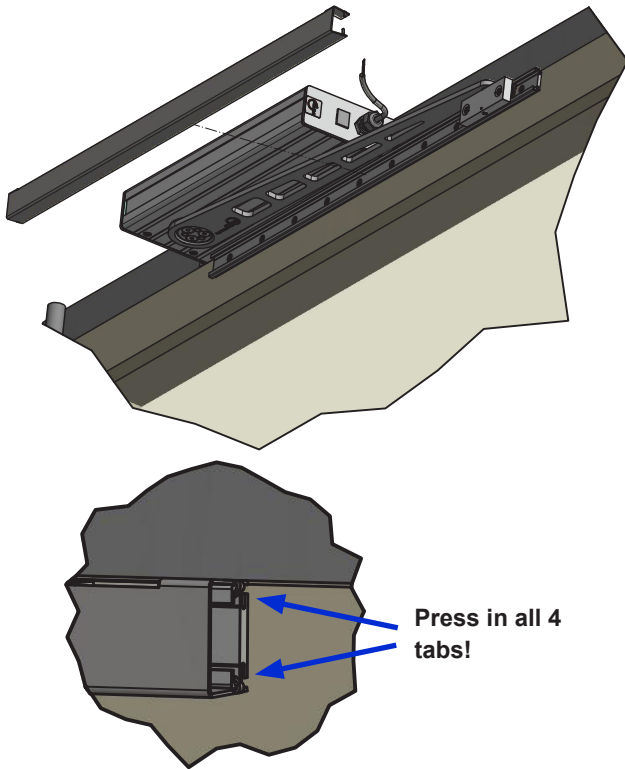Issue: 1.1/09.2022

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3.10. Mount the cover

Perform RESET-run & TEST-run

7 — Mount **cover**

Figure 23

Press in all 4 tabs!

4. Technical Data

Table 1: Electrical characteristics

Actuator type	PA-KL²-DF-K	PA-KL²-DF
Rated voltage	24 VDC	
Permissible rated voltage range	24 VDC ±15 %	
Ripple of rated voltage Vpp	maximum 500 mV	
Undervoltage detection	Yes	
Rated current[1]	1.1 A	1.5 A
Maximum starting current "OPEN" / "CLOSE"	1.3 A	1.7 A
Maximum cut-off current in "OPEN" / "CLOSE" direction	1.2 A	1.6 A[2]
Current consumption after cut-off (closed current)	65 mA	
Cut-off via	built-in electronic overload cut-off	
Maximum permissible number of actuator units connected in parallel[3]	4	
Cable lenght between two actuator in synchronous operation[3]	max. 10 m	
Overtravel time in endposition range[4]	3 s	
Protection class	III	

(1) Maximum current consumption at nominal load.

(2) In special cases, the cut-off current in the "OPEN" direction can be increased up to 2.0 A with SICO LINK.

(3) Maximum cable length for bus communication between two actuator

(4) The stopping time indicates how long the actuators connected in synchron remain activated after the triggering actuator has been cut off.

⚠ **ATTENTION**

The rails and slides supplied and their fastening must only be loaded with max. 500 N!

If a cut-off current > 1.6 A is selected, the rail can be overloaded and depending on the application, this can lead to mechanical damage to the actuator and rail.

The manufacturer does not assume any warranty if the normal load on the rail is more than 500 N due to made software settings!

Table 2: Volt-free contact (NO1 / NO2)

Actuator type	PA-KL²-DF-K	PA-KL²-DF
Rated voltage	max. 28 VDC	
Relay contact load	max. 2.0 A	

⚠ **ATTENTION**

The maximum load capacity of the contact must not be exceeded!

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Table 3: Connection and operation

Actuator type	PA-KL²-DF-K	PA-KL²-DF
Recommended connection cable standard	6×0.75 mm²	
Recommended connection cable NSHEV	Heat-resistant silicone cable EWKF 6×0.75 mm²	
Pause time during change of direction[1] or re-actuation	at least 500 ms	
Switch on	ED 30 % S2	
Stability of opening and closing cycles	> 11.000	
Sound level[2]	< 70 dB(A)	
Deadlock according to prEN 12101-9 / ISO 21927-9	allowed	
Multiple triggering after stop	allowed	
Maintenance	See attached sheet "Safety instructions and warranty conditions"!	

(1)   For the direction change (polarity reversal) it is necessary that the supply ensures a pause time (zero volt range) of at least 500 ms.

(2)   Measured at a distance of one meter under normal conditions.

Figure 24: Zero volt range at change of driving direction
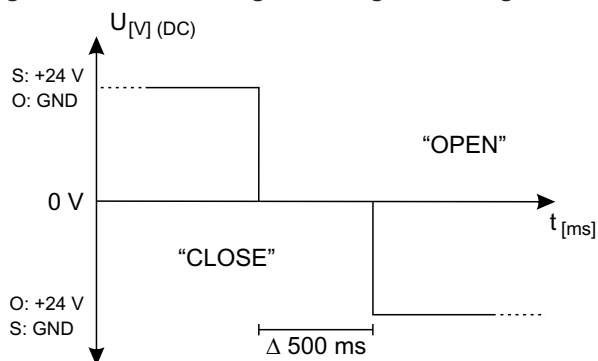
⚠ ATTENTION

Voltage stability/quality: only defined cut-off processes are permitted (switch-off time from rated voltage 24 volts to 0 volts in t <10 ms).

This applies in particular for switching operations from primary (mains operation) to secondary energy source (emergency power batteries).

Table 4: Mechanical properties

Actuator type	PA-KL²-DF-K	PA-KL²-DF
Maximum pushing force [1]	400 N	500 N
Maximum pull force[1]	400 N	500 N
Condition of loading	Open against nominal load / Close against rated load	
Nominal locking force	700 N	
Nominal opening angle[2]	140 deg	
Stroke speed at nominal load[3]	3.1 deg/s	2.8 deg/s
Stroke speed partial load[4]	3.5 deg/s	3.2 deg/s
Material surface housing	Aluminium E6/EV1 Coatings in all RAL and DB colours possible	
Material lever	stainless steel	
Dimensions (L×W×H)[5]	368×58×118 mm	568×58×118 mm
Weight[6]	3.6 kg	4.1 kg

(1)   Only under optimal conditions, pushing force parametrisable via SICO LINK.

(2)   The nominal opening angle can deviate by ± 5% due to mechanical damping.

(3)   Based on 140 deg opening angle of the lever arm; deviation ± 10%.

(4)   Based on 140 deg opening angle of the lever arm at respective partial load of 70%; deviation ± 10%

(5)   See chapter 1.1: „Figures and Dimensions" on page 3.

(6)   Without bracket set.

Table 5: Installation and ambient conditions

Actuator type	PA-KL²-DF-K	PA-KL²-DF
Rated operating temperature	20 °C	
Permissible ambient temperature range	0 °C – 75 °C	
Ingress protection	IP 54	
Usage range	Central European environmental conditions ≤ 2.000 metres above sea level	

Table 6: Approvals and certificates

Actuator type	PA-KL²-DF-K	PA-KL²-DF
CE-compliant	In accordance with EMC directive 2014/30/EU and low voltage directive 2014/35/EU	
Heat resistance	according to EN 12101-2 – B300	
Safety of electrical appliances	according to EN 60335-1:2012/ A11:2014 and EN 60335-2-103:2015	
Further approvals	On request	

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