KOMP-ACT

KOMP-ACT SA

END-USER MANUAL

2020 KLA Product Line

November 2020

Note

The information in this documentation reflects the stage of development at the time of press and is therefore without obligation. KOMP-ACT SA reserves itself the right to make changes at any time and without notice to reflect further technical advance or product improvement.

Document Version 2.0 / November 2020

Table of Contents

1 References

Product category	Title	Source
Actuator	Datasheet of the KLA-40-040-0F1-2	www.komp-act.com/products/electric-linear-actuators/
Actuator	Datasheet of the KLA-40-040-0F3-2	www.komp-act.com/products/electric-linear-actuators/
Controller	Datasheet of the KDRV-1-MK-X-X	https://www.komp-act.com/products/electronic-controller/

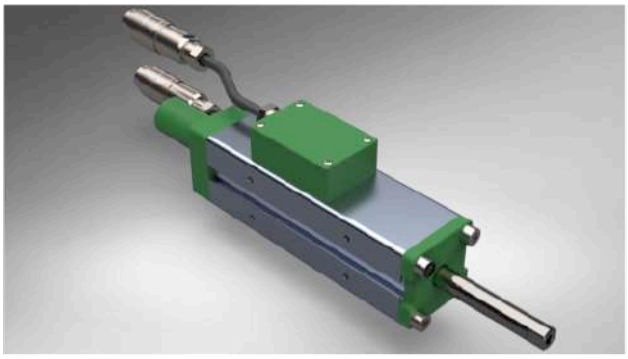
2 Product portfolio

KOMP-ACT's CE-certified product portfolio includes a product line of electric linear actuators, which should be used in conjunction with KOMP-ACT's electronic controller, also called KDRV-1-MK-X-X, and its related end-user interface.

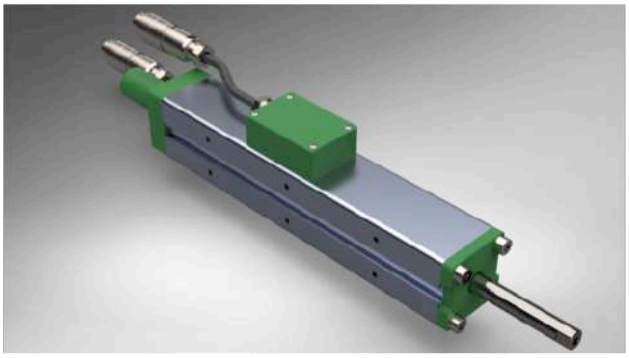
The KLA product line consists of two actuators, whose difference lies in their maximum achievable level of performance. While the KLA-40-040-0F1-2 can reach a peak force of 30 [N], the KLA-40-040-0F3-2 can perform three times better with a peak force up to 90 [N]. KLA actuators come with an electronic controller and an embedded web-server end-user interface as presented in the figure 2-1.

These two categories of electric linear actuators are fully programmable with the help of an end-user interface working via the KDRV-1-MK-X-X electronic controller. This plug-and-play solution doesn't require any specific hardware and is easily installed via a USB cable between the electronic controller and a user's laptop.

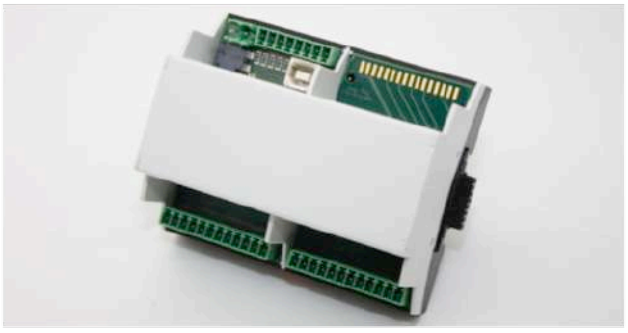
In other words, KOMP-ACT's end-user interface is a web-based platform. It enables a machine owner to set up, amongst other parameters, the required stroke, transfer time and cycling rate of one or two actuators performing tasks independently or simultaneously.



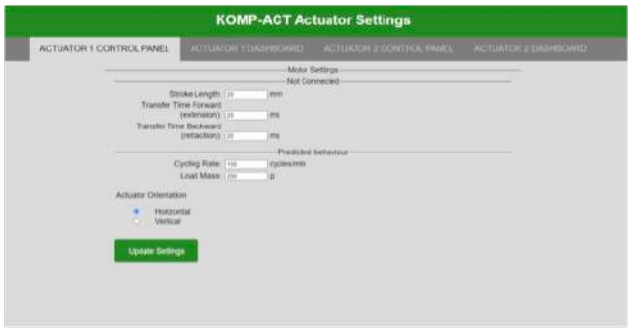
KLA-40-040-0F1-2 electric linear actuator



KLA-40-040-0F3-2 electric linear actuator



KDRV-1-MK-X-X electronic controller



KOMP-ACT's end-user interface

Figure 2-1 KOMP-ACT's product portfolio

3 Model number

3.1 Nomenclature of the KLA actuators

KOMP-ACT's product line includes two categories of electric linear actuators: KLA-40-040-0F1-2 and KLA-40-040-0F3-2. Their nomenclature is composed of six dimensions, which is explained in the table 3-1 below:

KLA	XX	040	0FX	X	XX
Product model	Body size	Stroke	Force variant	Coils	Optional
Linear actuator	40x40 mm	40 mm	0F1 = 30 [N] 0F3 = 90 [N]	1 – 24 Volts 2 – 48 Volts	ML: Magnetic Lock W: Waterproof Seals

Table 3-1 Explanation of the nomenclature related to KLA actuators

3.2 Nomenclature of the KDRV electronic controller

The nomenclature of KOMP-ACT's KDRV-1-MK-X-X electronic controller can be explained as follows:

KDRV	1	MK	X	X
Product model	Series number	Version type	Bus connector	Field Bus
Driver	First series	Mikrocontroller	Optional	Optional

Table 3-2 Explanation of the nomenclature related to KOMP-ACT's electronic controller

4 Intended use

4.1 Industrial context

KOMP-ACT's fully electric actuation system is made for the packaging industry in the beverage, food, and non-food sectors.

4.2 Market applications

KOMP-ACT's complete plug-and-play solution is suitable for mainstream machine applications requiring programmable stroke as well as highly accurate and fast positioning time, usually expected for packaging machines, material handling and factory automation.

4.3 Machine profiles

KOMP-ACT's electric motion technologies, including linear actuators and electronic controller, fit many machine applications in the automation industry to increase a machine's performance and reduce energy costs.

4.3.1 Filling machines

KOMP-ACT produces reliable, fast-motion and programmable devices for the beverage sector. KOMP-ACT products can reduce a machine's filling time and prevent product waste caused by inaccurate filling issues.

4.3.2 Wrapping machines

KOMP-ACT is the right solution for wrapping applications that require fast motion and high cycling rate. This solution is easy to use: no redesign needed, fast implementation guaranteed and a cost-effective system. The objective is to significantly minimize machine equipment costs, while increasing productivity and efficiency.

4.3.3 Packaging machines

KOMP-ACT assists in the transition to fully electric packaging machines. KOMP-ACT's plug-and-play solution meets the most stringent end-user requirements without neglecting the importance of equipment costs. It also reduces energy consumptions and increases a machine's Overall Equipment Effectiveness.

5 Installation requirements

5.1 Linear electric actuators

KLA actuators' design fits on most of the existing machine applications and are suitable for horizontal and vertical applications.

KLA actuators can be mounted on both sides and on the front face. As a result, two or more actuators can be installed side by side.

However, for machine design requiring two or more actuators to be installed side by side, a bracket support is needed to obtain an anti-rotating and an additional mechanical guiding feature.

As illustrated in the figures 5-1 and 5-2, KLA is a built-in design composed of a mounting interface and a hard-anodized aluminum body, which contains the modular electro-magnetic stator and provides the heat dissipation functionality. As a result, neither air or liquid cooling nor additional accessories such as a heat sink or fans are needed even at a high cycling rate.

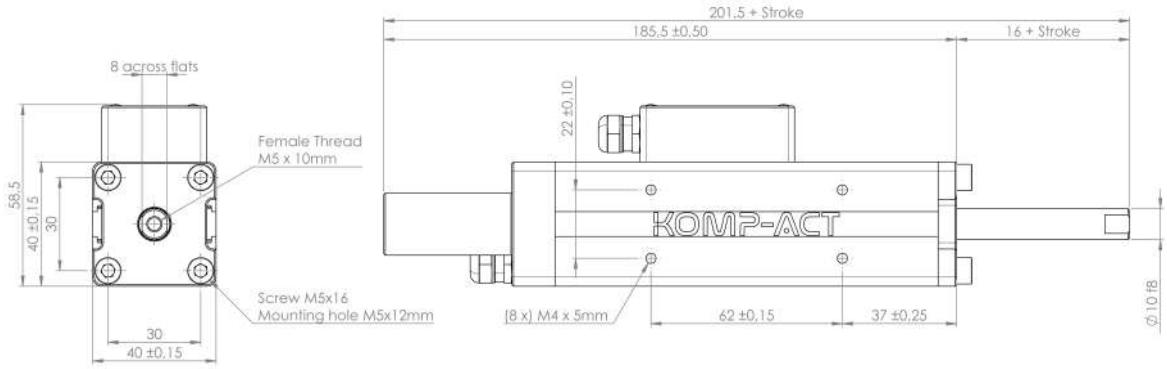


Figure 5-1 Mounting interface of KLA-40-040-0F1-2

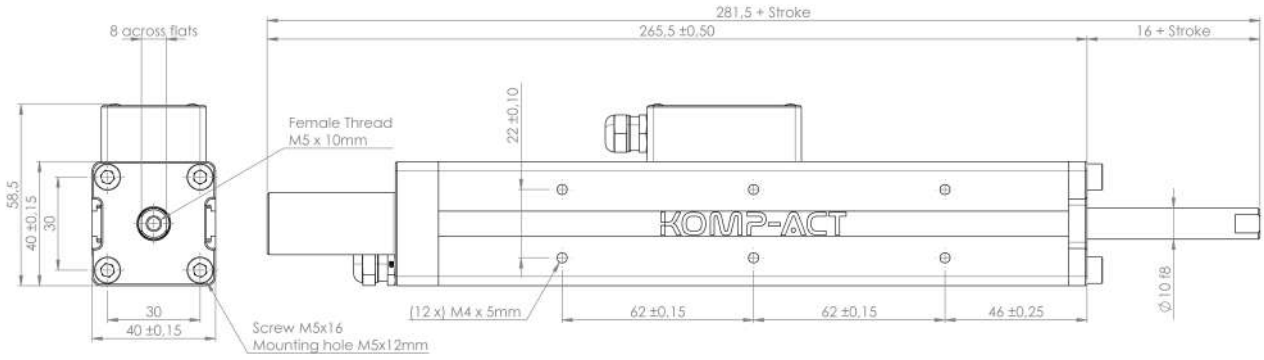


Figure 5-2 Mounting interface of KLA-40-040-0F3-2

5.2 Electronic controller

The electronic controller should be connected to a Windows laptop in order to access the interface panel.

The controller should be connected to the USB port of the laptop by using a USB cable (Male USB B to male USB A). The USB port is a type B female port.

5.3 End-user interface

In order to access the end-user interface, a Windows (7, 8, 8.1 or 10) laptop with a web browser (Edge, Chrome, Firefox or Opera) installed is required.

Nevertheless, no additional software needs to be installed to complete the implementation of KOMP-ACT's solution.

6 Description of the actuator

6.1 Product description

KOMP-ACT's KLA product line, presented in the figure 6-1 below, is a three-phase iron-core modular actuator designed to meet compactness, low cost and high performance expected by customers for machine automation solutions.

These electric actuators are synchronous motors, which use magnets to generate the linear motion and directly move the slider without the need for mechanical transmission elements like ball screws, toothed belts or gearboxes.

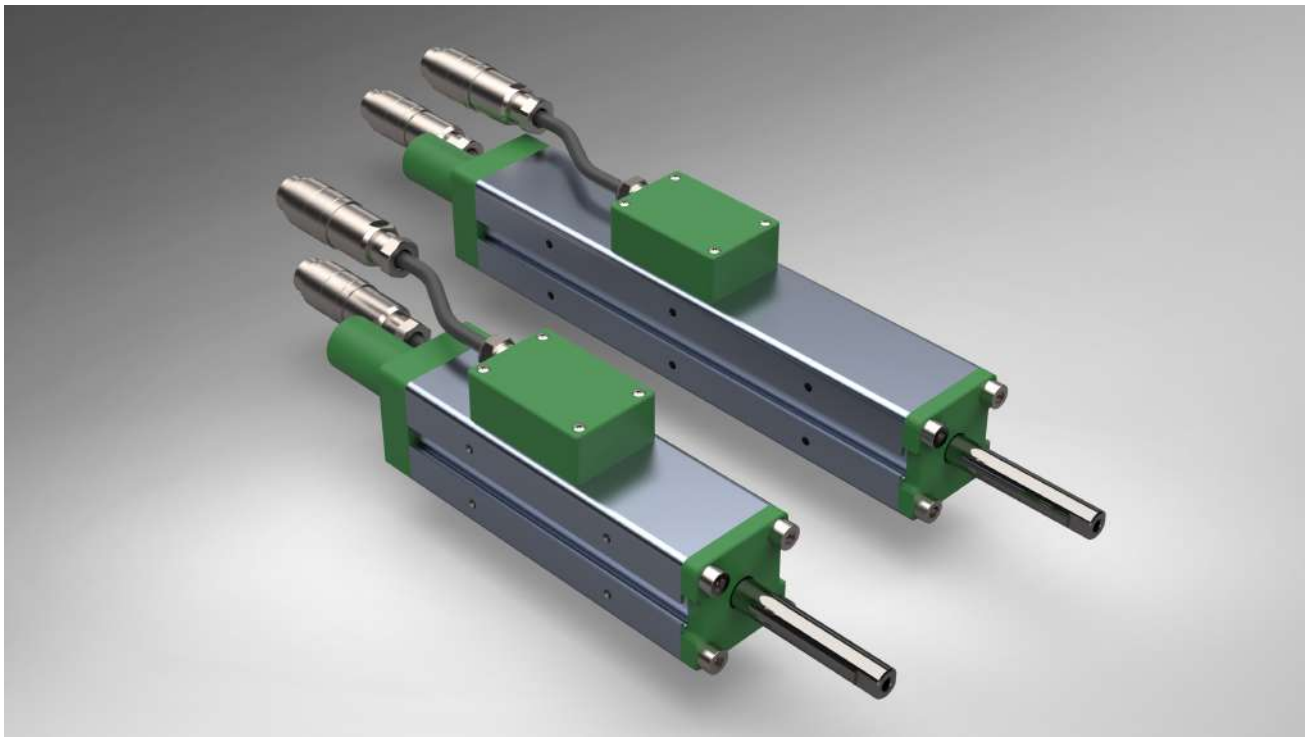


Figure 6-1 KLA-40-040-0F1-2 on the left side and KLA-40-040-0F3-2 on the right side

6.2 Technical data

Technical data of the KLA-40-040-0F1-2 and KLA-40-040-0F3-2, whose main difference lies in their force, are provided in the tables 6-2 and 6-3 respectively:

Continuous force	F_c	[N]	10
Peak Force	F_p	[N]	30
Continuous current	I_c	[A]	1
Peak current	I_p	[A]	6
Phase resistance	R_p	[Ohm]	3.3
Stroke length	S_{max}	[mm]	40
Repeatability		[mm]	±0.1
Accuracy		[mm]	±0.5
Acceleration	Acc_{max}	[m/s^2]	100
Top speed	V_{max}	[m/s]	2.0
Max cycles per minute *			200
Lifecycle	Max cycles		20 Mio.
Power supply	DC	[V]	24 or 48
Operating temperature	[°C]		-20…+45
Minimum operating pressure	[hPa]		750
Slider mass	M_s	[kg]	0.15
Total mass	M_T	[kg]	1.00
Rod bearings	Sintered bronze		
Housing Material	Hard-anodized aluminum (aerospace grade)		
Shaft Material	Hard-chrome plated steel		

Table 6-2 Technical data of the KLA-40-040-0F1-2

Continuous force	F_c	[N]	30
Peak Force	F_p	[N]	90
Continuous current	I_c	[A]	1.8
Peak current	I_p	[A]	6
Phase resistance	R_p	[Ohm]	6.6
Stroke length	S_{max}	[mm]	40
Repeatability		[mm]	±0.1
Accuracy		[mm]	±0.5
Acceleration	Acc_{max}	[m/s^2]	100
Top speed	V_{max}	[m/s]	2.0
Max cycles per minute *			200
Lifecycle	Max cycles		20 Mio.
Power supply	DC	[V]	24 or 48
Operating temperature	[°C]		-20…+45
Minimum operating pressure	[hPa]		750
Slider mass	M_s	[kg]	0.26
Total mass	M_T	[kg]	1.46
Rod bearings	Sintered bronze		
Housing Material	Hard-anodized aluminum (aerospace grade)		
Shaft Material	Hard-chrome plated steel		

Table 6-3 Technical data of the KLA-40-040-0F3-2

6.3 Connection

Please note that the actuator should be plugged before powering the electronic controller in order to launch the recognition.

The calibration of the actuator is automatically performed, at each power up, when the first two command signals are sent to the electronic controller. During the calibration, the shaft will retract at low speed until it touches the damped mechanical stopped located in the rear cap. For optimal results, please maintain the actuator in the retracted position during the calibration process.

If the actuator movement is not as expected, please power off the electronic controller. Wait five seconds and power it on again. The calibration should then be performed again.

6.4 Set up

KLA actuators come with an electronic controller and an embedded web-server end-user interface, which allows to program different parameters.

The motion profile is automatically set to reach the optimum efficiency in function of the specified parameters (i.e. such as the stroke length, the transfer time forward and backward, the cycling rate, the load mass and the actuator orientation).

Thanks to its specific integrated sensing technology, KLA actuators automatically recalibrate the mover position without the need for manual intervention after each reboot.

6.5 Power supply

The KLA product line is optimized for 24 and 48 Volts.

7 Description of the electronic controller

7.1 Product description

Thanks to its two motor outputs, KDRV-1-MK-X-X electronic controller can simultaneously control up to two actuators even if they have to perform tasks differently and independently.

After connecting the driver to the end-user interface with the help of the USB port (see figure 7-1), its control algorithm automatically calculates the optimum motion profile of the actuator(s) to reach the maximum efficiency.

The actuator's calibration is automatically performed at each power up thanks to the two input signals. The calibration procedure retracts the shaft until it reaches the mechanical stopper, then it moves to the zero position.

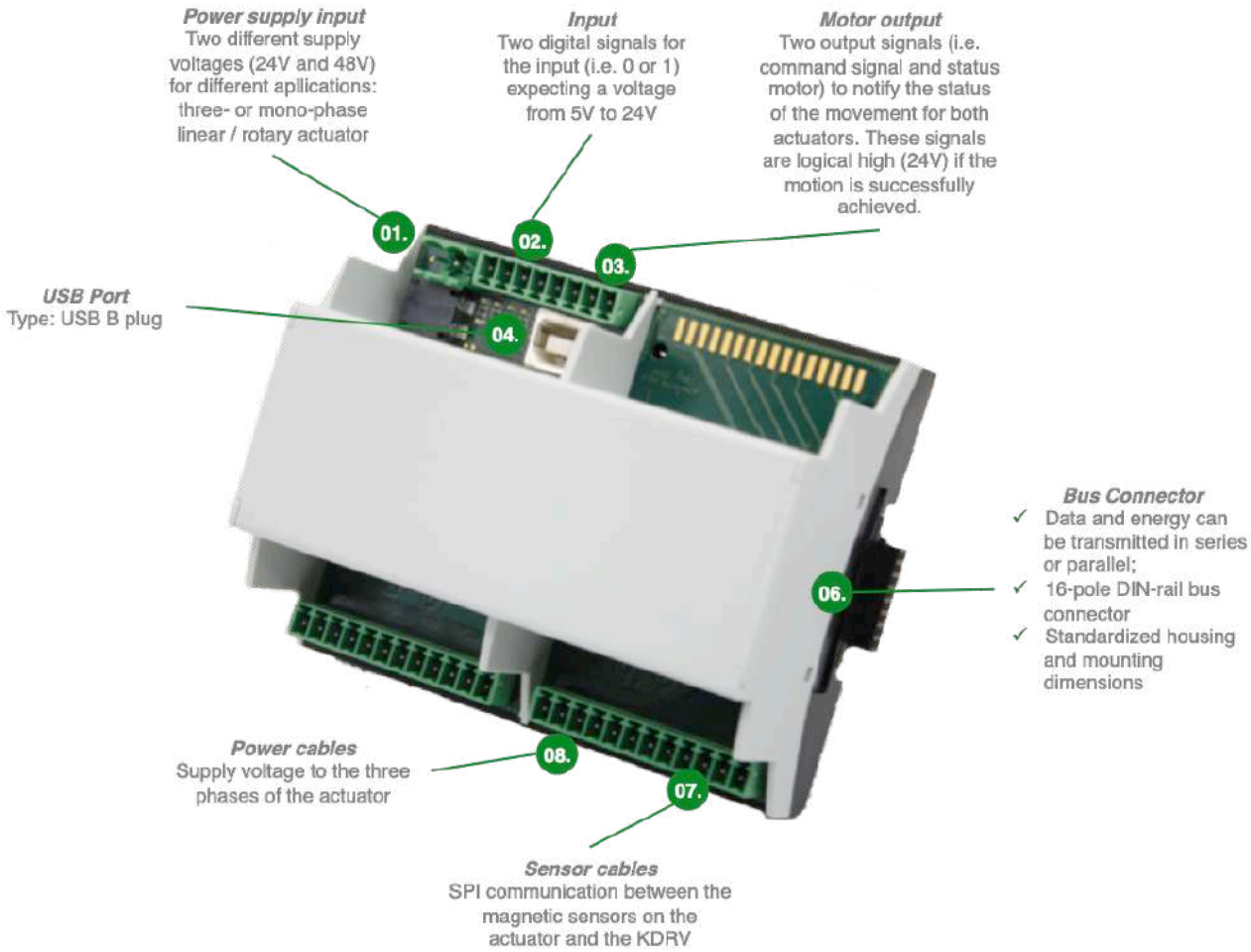


Figure 7-1 Picture of KOMP-ACT's electronic controller, KDRV-1-MK-X-X

7.2 Technical data

The technical data of the electronic controller KDRV-1-MK-X-X can be found here:

Power supply	$V+_{in}$	[V] DC	24/48
Command signal	Sig_{cont}	[V] DC	5 - 24
Power supply current limit	I_{lim}	[A]	10
Ground connections	Gnd	QTY	2
User interface port	InP	Type	USB B RNDIS through TCP/IP
Motor power supply	V_{out}	[V] DC	24/48
Start-up delay *	De_{max}	Seconds	3
Motors supported	N	QTY	2
Temperature range		[°C]	From 0 to +80
Cooling **	C_{typ}	Type	Passive
Dimensions		[mm]	107 x 89.7 x 62.2
Weight	W	[g]	160
Support	SU_{typ}	TYPE	DIN rail (DIN43880, NS 35)

Table 7-2 Technical data of KOMP-ACT's electronic controller, KDRV-1-MK-X-X

* The start-up delay is related to the initial powering of the board and not to the actuator's first movement.

** Keep a distance of 20 mm minimum free in front of the ventilation holes to ensure adequate airflow.

7.3 Connection

The USB port (presented in the figure 7-3 below) should be used to connect the electronic controller to a laptop, which will give access to the end-user interface.

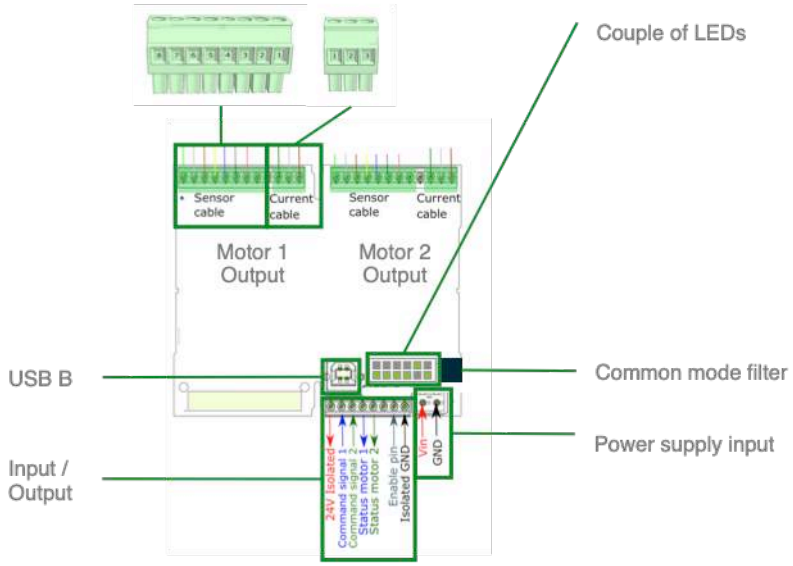


Figure 7-3 Connection scheme of KOMP-ACT's electronic controller, KDRV-1-MK-X-X

Each couple of LEDs located in the right corner of the figure 7-4 below is related to a specific signal, which is at a low or high state depending on the two actuators' status. The state reached for each input or output will be shown as a red light.

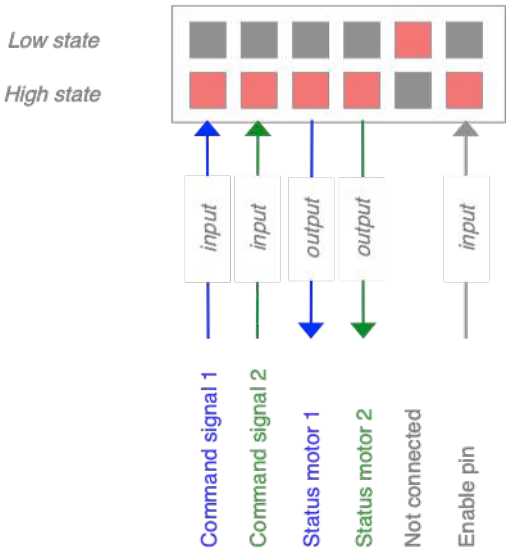


Figure 7-4 Description of the LEDs on KOMP-ACT's electronic controller, KDRV-1-MK-X-X

The inhibit pin serves as a precaution in order to directly disconnect all the actuators connected to the board. If the inhibit pin is high (5V-24V), then the actuators will perform the task depending on the control signal. If it is low (0V), the actuators will not react to the command signals.

7.4 Set up

The motor terminal expects the connection with the two actuators' cables using the green pluggable connectors. Please note that the pluggable connectors can only be connected in one unique way. DO NOT USE FORCE. Force is indeed not required to plug the connectors. Otherwise, it means that the connectors were not positioned correctly.

The power connector of a KLA actuator is connected to a 3-terminal block connector, while its sensor connector is related to a 5-terminal block connector. The power and sensor connectors should be placed as described in the next sections 7.4.1 and 7.4.2 respectively.

7.4.1 Power connector

The power connector has three terminal blocks and is depicted in the figure 7-5 below.

Figure 7-5 Scheme of the power connector on the controller side

It should be connected on the left. The left side of the connector should meet the left extremity of the terminal as illustrated in the figure 7-6.

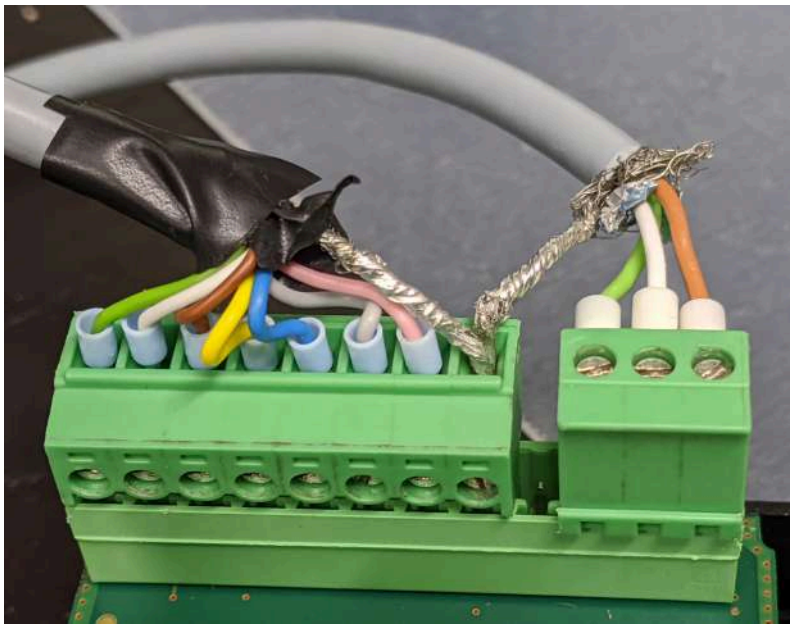


Figure 7-6 Picture of the expected motor cable connections

The shielding on both cables should be connected to the ground via the unused pin of the sensor's connector. As shown in the figure 7-6, both shielding should be connected to the unused pin and screwed tightly.

7.4.2 Sensor connector

The sensor connector has eight terminal blocks as described in the figure 7-7 below.

Figure 7-7 Scheme of the sensor connector on the electronic controller side

It should be connected on the right. The right side of the connector should meet the right extremity of the terminal as presented in the figure 7-8:

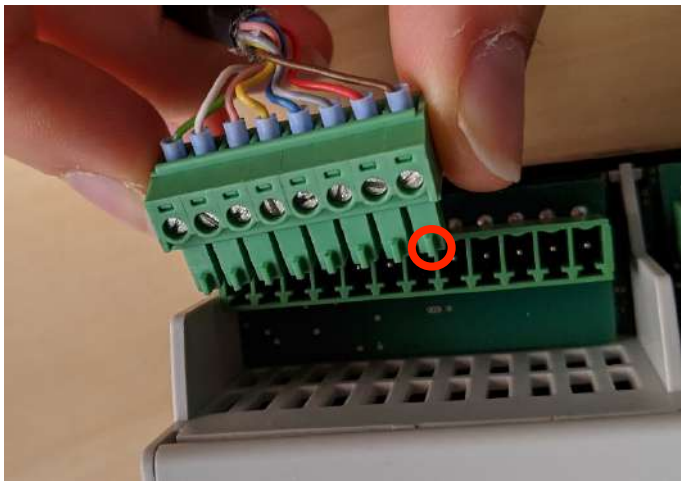


Figure 7-8 Picture showing how the board connector can be plugged, notice the small step (circled) on each connector´s leg

If the two connectors do not fit together, it means that one of them is not connected at one extremity of the terminal.

7.5 Power Supply

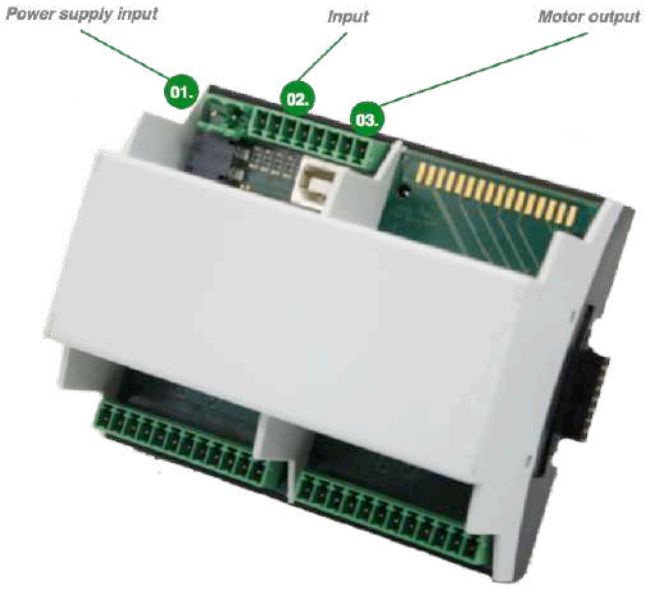


Figure 7-9 Power supply input, input and motor output of KOMP-ACT's electronic controller

7.5.1 Power supply

Two different supply voltages are available (24V DC and 48V DC) for different applications: three- or mono-phase linear / rotary actuator (see figure 7-9).

- 48V: Expects a supply of 48V DC and is able to provide continuously 2A for one actuator or 4A for two actuators.
- GND (on the power supply terminal): Expects the ground of the power supply providing the 48V.

The two cables for the power supply should be twisted together for the purposes of improving electromagnetic compatibility (see figure 7-6).

7.5.2 I/O Terminal

The input is the command to the controller. There are two digital signals for the input (i.e. 0 or 1), which expect a voltage ranging from 5V to 24V.

- 0 (i.e. 0V) sends the command to retract
- 1 (i.e. anything above 5V) sends the command to extend

For optimum results, please use a 24V signal. In addition, the ground of the command signals must be connected to the ground of the input connectors (i.e. ground isolated).

There are two output signals (i.e. command signal and status motor) to notify the status of the movement for both actuators. These signals are logical high (24V) if the motion is successfully achieved, which will be shown as a red LED in the figure 7-4.

8 Description of the end-user interface

8.1 Product description

Since KOMP-ACT drivers can actuate up to two actuators simultaneously, there are two tabs available on the end-user interface for each actuator (i.e. the control panel and the dashboard as shown in the figure 8-1) to enable a user to set them up.

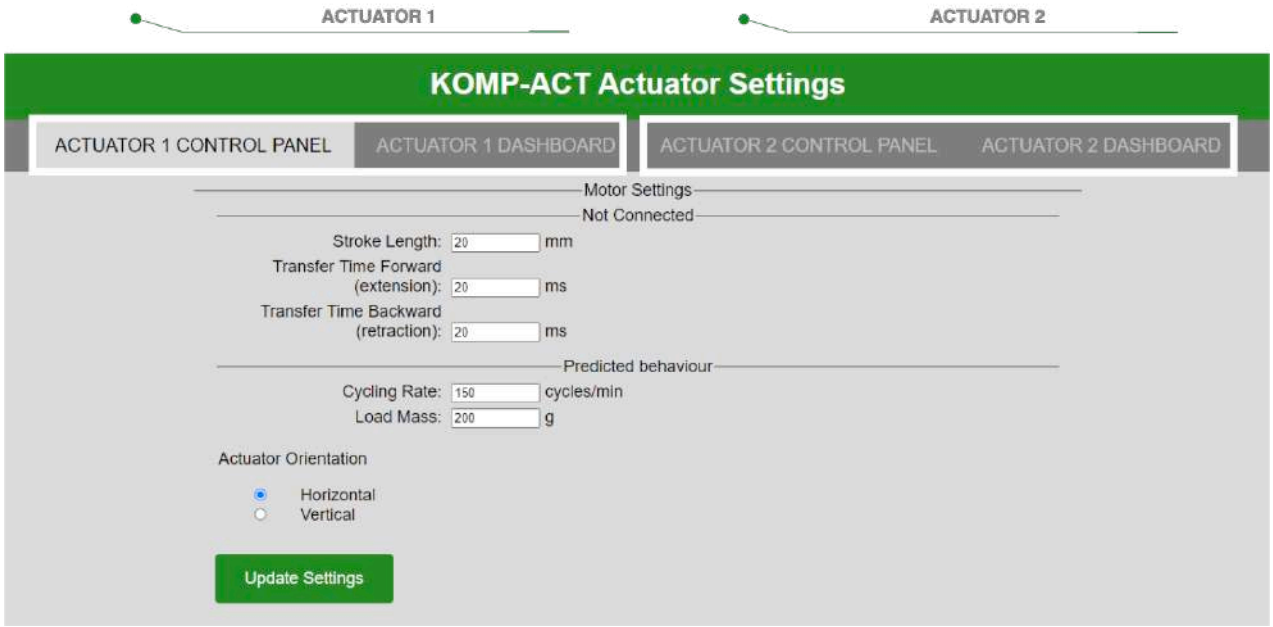


Figure 8-1 KOMP-ACT's end-user interface

8.2 Technical data

Some parameters of each actuator can be modified with a specific data range as explained below:

- Stroke length: Since the electronic controller will automatically recognize the stroke length of the actuator connected to the board (i.e. electric controller), this value is already set and corresponds to 40 for the KLA-40-040-0F1-2 and KLA-40-040-0F3-2.
- Transfer time forward: this value can be fixed within a defined range from 15 to 500 [ms].
- Transfer time backward: this value can be fixed within a defined range from 15 to 500 [ms].
- Cycling rate: this value can be fixed within a defined range from 0 to 200 cycles per minute.
- Load mass: this value can be fixed within a defined range from 0 to 1000 g.
- Actuator orientation: the position of the actuator can be calibrated either horizontally or vertically.

The starting forward and starting backward orders are given by the central control system of the machine.

8.4 Connection

Once the controller is connected to the laptop, please open a web-browser window. Then, type in the search bar: *10.0.0.2*. It is the IP address of the controller. Once the search has been launched, the end-user interface should show up.

8.5 Set up

KOMP-ACT drivers can actuate up to two actuators simultaneously. The two actuators driven by the same driver can be parameterized differently and are able to perform completely different and independent tasks, as they can be linked to perform synchronized motions.

At the beginning of each power up, the actuator should be calibrated. Although the actuator motion profile is generated automatically via the end-user interface to meet the specified transfer time and cycling rate at optimum efficiency, settings can still be manually updated on the CONTROL PANEL tab. In order to update the settings of the first actuator, please go to the "ACTUATOR 1 CONTROL PANEL" page (see figure 8-2). The values in the fields (such as the stroke length, the transfer time forward/backward, the cycling rate, the load mass and the actuator orientation) can be then modified. By clicking on the "Update Settings" button, the values are updated. Be aware that the actuator(s) should be at rest during the update process, i.e. no command signal.

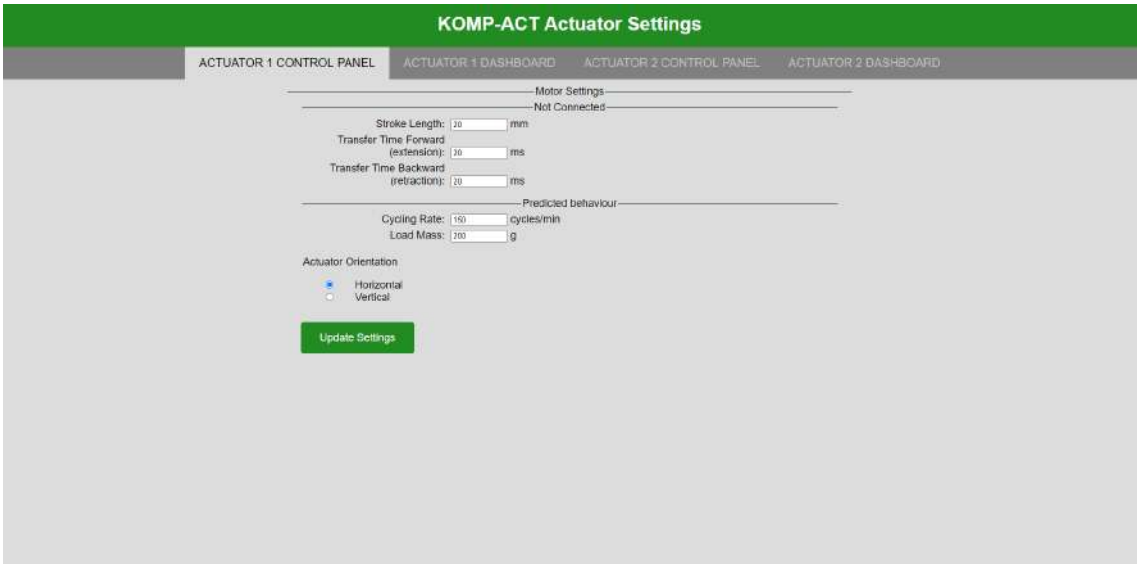


Figure 8-2 ACTUATOR 1 CONTROL PANEL tab of KOMP-ACT's end-user interface

As depicted in the figure 8-3, it is possible to review the position of the first actuator after setting it up on the "ACTUATOR 1 DASHBOARD" tab.

To change it, go back to the « ACTUATOR 1 CONTROL PANEL » tab, modify the settings and update them.

The status of the actuator can be assessed on the « ACTUATOR 1 DASHBOARD » tab as follows:

- Calibrating: the actuator is calibrating to meet the new settings;

- Calibrated: the actuator is calibrated based on the settings defined on the « ACTUAOR 1 CONTROL PANEL » tab;
- Retracting: for optimal results, please maintain the actuator in the retracted position during the calibration process;
- Retracted: the settings of the actuator can be modified on the « ACTUATOR 1 CONTROL PANEL » tab;
- Extending: for optimal results, please maintain the actuator in the retracted position during the calibration process;
- Extended: the settings of the actuator can be modified on the « ACTUATOR 1 CONTROL PANEL » tab.

Figure 8-3 ACTUATOR 1 DASHBOARD tab of KOMP-ACT's end-user interface

On the "ACTUATOR 2 CONTROL PANEL" tab presented in the figure 8-4, you will be able to update the settings of the 2nd actuator the same way than on the "ACTUATOR 1 CONTROL PANEL" tab for the 1st actuator.

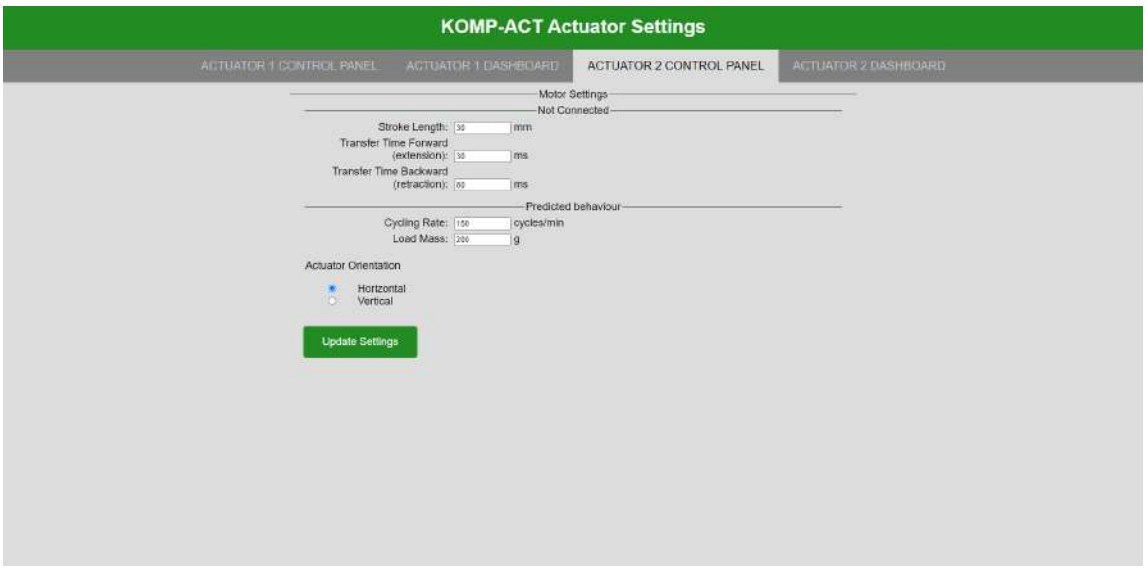


Figure 8-4 ACTUATOR 2 CONTROL PANEL tab of KOMP-ACT's end-user interface

On the “ACTUATOR 2 DASHBOARD” tab shown in the figure 8-5, you will be able to review the summary of the 2nd actuator the same way than on the “ACTUATOR 1 DASHBOARD” tab for the 1st actuator.

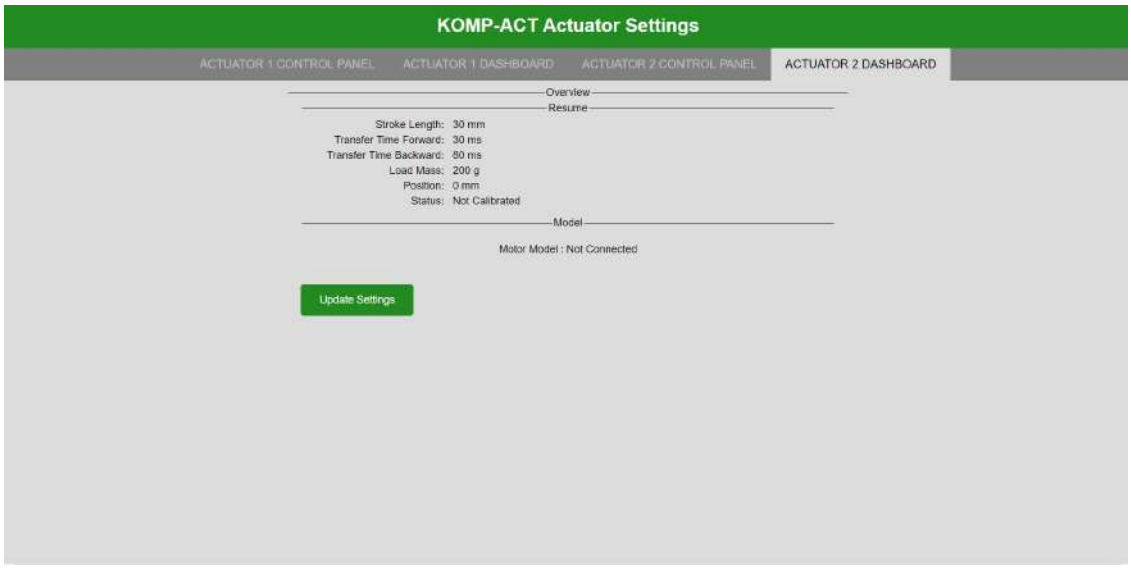


Figure 8-5 ACTUATOR 2 DASHBOARD tab of KOMP-ACT’s end-user interface

8.6 Power supply

The end-user interface can be accessed even though the controller is not alimented. The USB connection provides the necessary power. Please note that in order to set an actuator, it has to be plugged to the controller before powering the board.

- 24V (optional): 24V DC source if needed by the PLC to generate the command signal

9 Software documentation

9.1 State machine

The state machine is the heart of the software and describes the behavior of the actuator depending on the input signal (in blue) or mechanical event (in red).

The inputs are the signals given by the customer through the Command Signal 1 or Command Signal 2 port, which can be 0 or 1, and the end of the stroke (which is detected internally via the shaft position). The outputs are the motor situation, i.e. extended or retracted (the situation is defined at rest).

Here are the possible states:

- UNKOWN is the state right after the initialization, the motor situation is not known yet.
- MOVING CALIBRATION is the state while the motor is moving for the first time, after receiving 0 from the Command Signal. Please note that in order to receive 0 for the first time, the Command Signal has to come from 1 and then go back to 0. The calibration movement will always be toward the retracted situation in order to protect any object that could still be in front of the actuator. Since the calibration is not yet done, the physical position of the shaft is not known and thus, the PID regulator is not active yet during this phase. This state is only performed once after each start-up.
- CALIBRATION is the state where the motor is at rest after MOVING TO CALIBRATION, it is in the retracted situation and since the motor situation is known, a calibration is performed. From this state, the physical position of the shaft is known at any time and the PID regulator is active. This state is only performed once after each start-up.
- MOVING ACTIVE is achieved (once the calibration is performed) after receiving 1 from the Command Signal if the actuator is not already in the extended situation.
- ACTIVE POSITION is reached (once the calibration is performed) from MOVING ACTIVE once the end of the stroke is attained. ACTIVE position corresponds to the shaft being extended.
- MOVING HOME is achieved (once the calibration is performed) after receiving 0 from the Command Signal, if the actuator is not already in the retracted situation.
- HOME POSITION is reached (once the calibration is performed) from MOVING HOME once the end of the stroke is attained. HOME position corresponds to the shaft being retracted.

The actuator's calibration is automatically performed at each power up by requiring two Command Signal pulses. The calibration procedure retracts the shaft until it reaches the mechanical stopper, then it moves to the zero position.

If the Command Signal changes, the actuator will reverse the motion accordingly.

The end of stroke mechanical event corresponds to the shaft being at the home position or at the targeted end of stroke position.

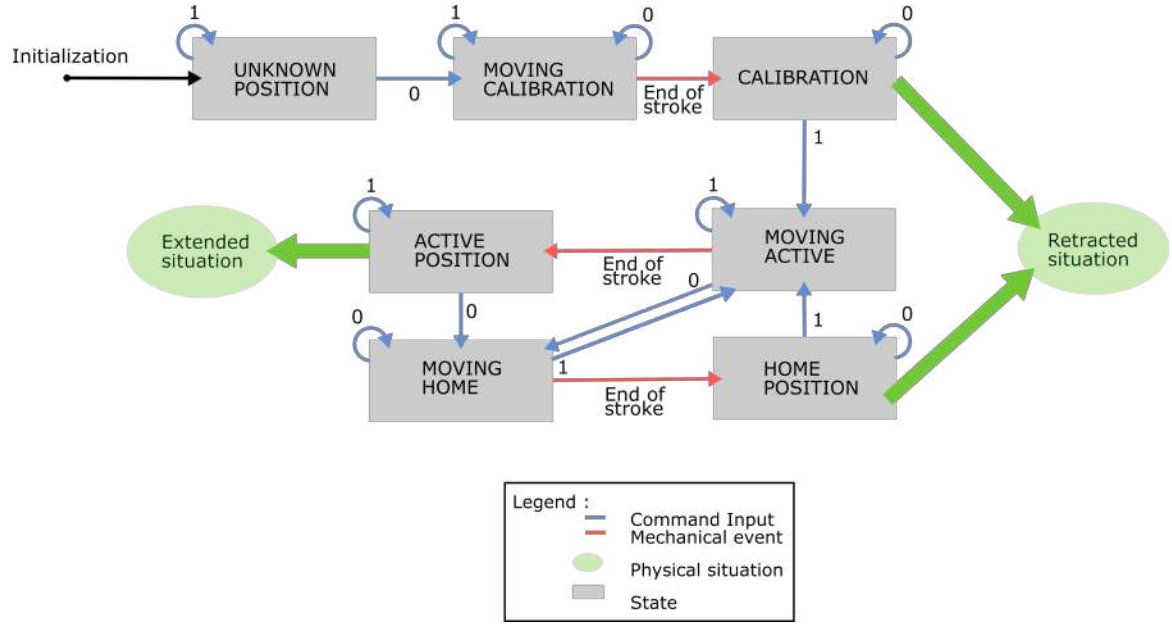


Figure 9-1 State machine of KOMP-ACT's complete solution

9.2 Motion profile

KLA electric linear actuators' motion profile can be described as trapezoidal. In the first phase x_a, KOMP-ACT's actuators accelerate with a constant acceleration until they reach the required speed. In the second phase x_b, they steadily operate the movement at a constant speed and finally decelerate back to rest in the last phase x_c.

This process is common in applications such as stacking, sorting, cutting and re-positioning.

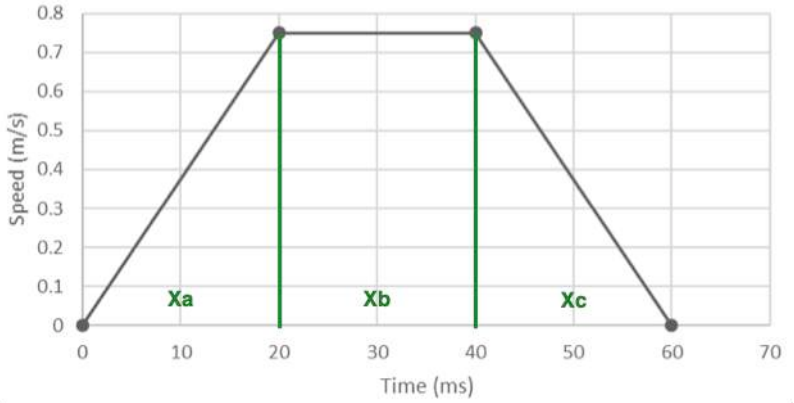


Figure 9-2 Trapezoidal profile for a specific example of 60ms stroke

10 Features / accessories

10.1 Cables

Power and sensor cables, as well as the required connectors, can be furnished with KOMP-ACT's KLA product line.

The nomenclature of the KLA-PWR-X-03-HF-A power cable and of the KLA-SNR-X-03-HF-A sensor cable can be described as follows:

Cable nomenclature	Description	Explanation
KLA	Model	KOMP-ACT linear actuator range
XXX	Cable type	SNR: sensor PWR: power
X	Fixed field	For future additional options
XX	Cable length	01: 1 m 03: 3 m 05: 5 m
HF	Application type	High flexible cable
A	Connector option	For additional options

Table 10-1 Cable nomenclature

Operating temperature of both cables is in a range from -5 °C to + 70 °C.

The KLA-PWR-X-03-HF-A power cable should be plugged on a KLA actuator with the help of a 4-DIN power connector and connected to the electronic controller using a 3-terminal block connector.

Similarly, the KLA-SNR-X-03-HF-A sensor cable should be plugged on a KLA actuator with the help of an 8-DIN sensor connector and connected to the electronic controller using an 8-terminal block connector.

The sensor and power cables should be plugged on the first motor output of the KDRV electronic controller on the left side of the electronic controller, while the sensor and power cables of the second actuator should be plugged on its right side as illustrated in the figure 10-2.

An overview of the cables' and connectors' assembly is depicted in the scheme 10-2 below:

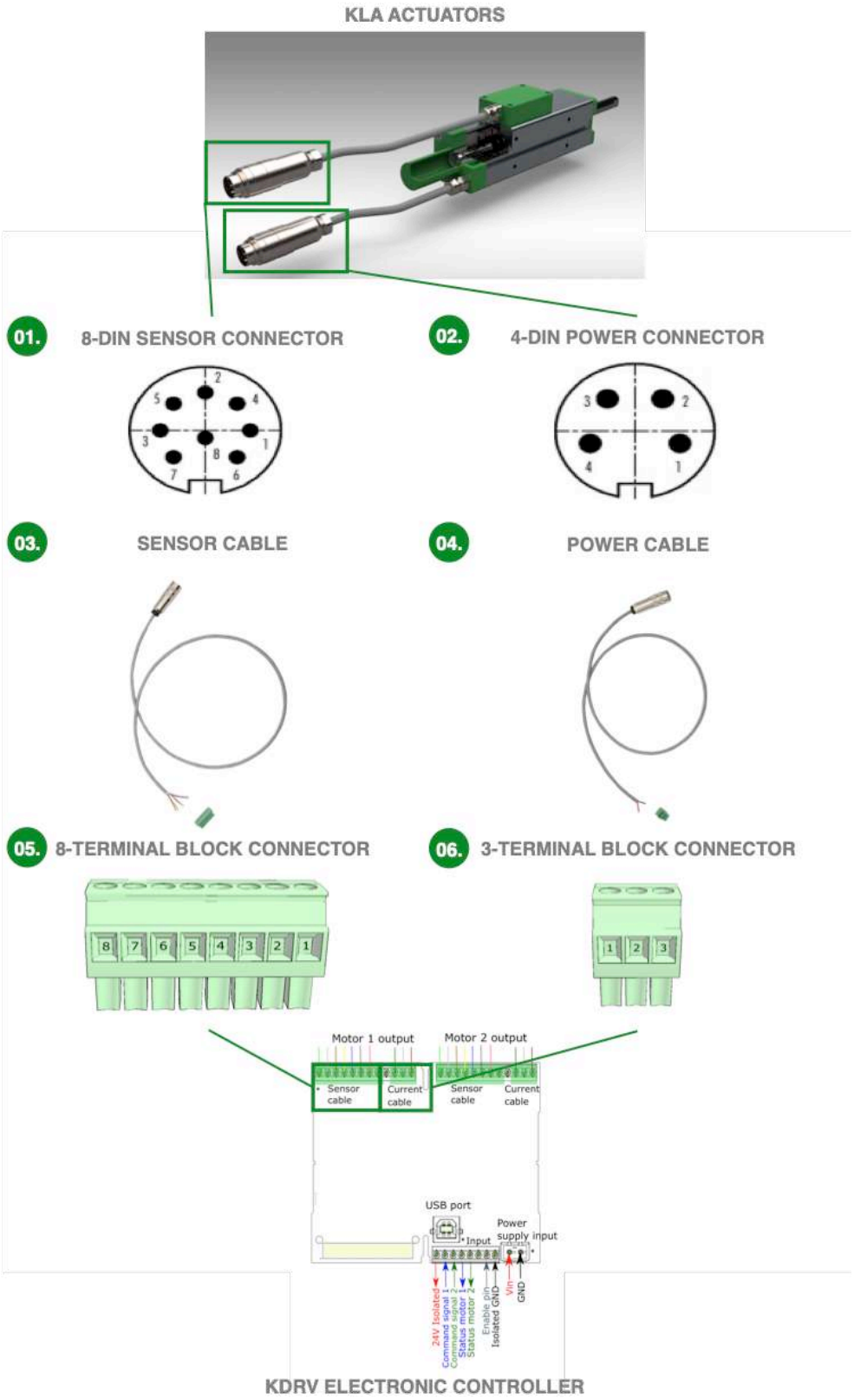


Figure 10-2 Assembly of the cables and connectors on KOMP-ACT's product line

10.1.1 Power cable

The KLA-PWR-X-03-HF-A power cable has the following characteristics:

Conductor material	Fine wire strands of bare copper wires
Core structure	3 x 0.50 mm^2 (3 x 20 AWG)
Core insulation	Special PVC-based compound
Outer sheat	Special PVC-based compound
Shield	Braiding with tinned copper wires
Rated voltage	500V
Operating temperature	-5 °C to + 70 °C
Outer diameter	6 mm

Table 10-3 Technical data of the power cables used in conjunction with KOMP-ACT's products

The power cable used for KOMP-ACT products has three standard lengths that can be chosen depending on the company's needs and machine requirements:

- 3 m
- 5 m
- 10 m

Custom lengths for the power cable are also available on request.

10.1.2 Sensor cable

The KLA-SNR-X-03-HF-A sensor cable has the following characteristics:

Conductor material	Fine wire strands of bare copper wires
Core structure	7 x 0.25 mm^2 (7 x 24 AWG)
Core insulation	Special PVC-based compound
Outer sheat	Special PVC-based compound
Shield	Braiding with tinned copper wires
Rated voltage	500 V
Operating temperature	-5 °C to + 70 °C
Outer diameter	6 mm

Table 10-4 Technical data of the sensor cables used in conjunction with KOMP-ACT's products

The sensor cable used for KOMP-ACT products has three standard lengths that can be chosen depending on the company's needs and machine requirements:

- 3 m
- 5 m
- 10 m

Custom lengths for the sensor cable are available on request.

10.2 Ferrite

On both extremities of each cable (i.e. power and sensor), there is one ferrite with 16 mm of outer diameter and 52 mm length.

They are provided with the cables on KOMP-ACT's KLA product line.

10.3 Connectors

10.3.1 Circular sensor connector

An 8-DIN sensor connector is required to plug the KLA-SNR-X-03-HF-A sensor cable on a KLA actuator.

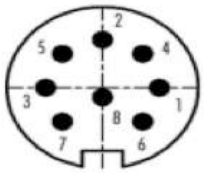


Figure 10-5 A 8-DIN sensor connector used in conjunction with KLA-SNR-X-03-HF-A sensor cable

10.3.2 Circular power connector

A 4-DIN power connector is required to plug the KLA-PWR-X-03-HF-A power cable on a KLA actuator.

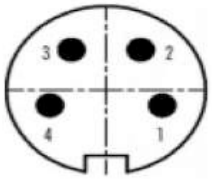


Figure 10-6 A 4-DIN power connector used in conjunction with KLA-PWR-X-03-HF-A power cable

10.3.3 Terminal block connectors

Two terminal block connectors are required for the right functioning of the electronic controller: a 3- and 8-terminal block connector.

The KLA-PWR-X-03-HF-A power cable should be plugged on the electronic controller with the help of an 8-terminal block connector, while the KLA-SNR-X-03-HF-A sensor cable with a 3-terminal block connector.

The two block connectors should be plugged on the motor output area of the board, which is split into two parts: the sensor cable area and the current cable area. The 8-terminal block connector should be plugged in the sensor cable area, while the 3-terminal block area in the current cable area.

More explanations about the 3- and 8-terminal block connectors can be found in the sections 7.4.1 and 7.4.2 respectively.

11 Troubleshooting

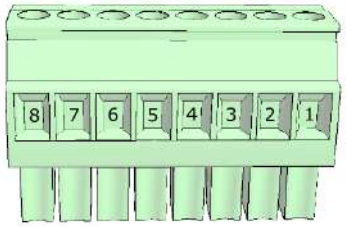
11.1 The wires were removed from the board connectors

In case the wires were removed form the green board connector, please follow the instruction bellow in order to reconnect them. First, take the connector with the face where the legs are smooth facing you. The leg's small step should be facing away from you (see figure 7-8 for the leg step visualization). Then, connect the wire:

11.1.1 Power connector (White ferrule)

1. Brown wire (should be printed the number 2 on it)
2. White wire (should be printed the number 1 on it)
3. Green wire

11.1.2 Sensor connector (Light blue ferrule)



1. Green wire
2. White wire
3. Brown wire
4. Yellow wire
5. Blue wire
6. Grey wire
7. Pink wire
8. Not connected

11.2 The actuator does not start

If the actuator does not move while input signals are sent, please check the connections on the I/O and the motor terminal. The enable PIN should be raised, i.e. connected to 5-24V DC.

11.3 The actuator does not behave as expected

If the actuator movement is not as expected, please power off the controller. Wait 5 seconds and power on again. The calibration should then be performed again (see section 8.4).

11.4 No connection to the end-user interface

If the interface cannot be accessed or if the connection is lost, please unplug the USB cable and re-plug it back. If the problem persists, please power off the controller, wait 5 seconds, and then power on again.

12 Maintenance information

KOMP-ACT's electric motion technologies have the following benefits:

12.1 Maintenance-free products

This complete plug-and-play electric solution – including linear actuators, electronic controllers and a web-based end-user interface – requires neither any additional accessories (e.g. heat sink, fans for air cooling or liquid cooling) nor software installation. As a result, there is no need for the maintenance of any accessories.

12.2 Automatic calibration

KLA actuator's calibration is automatically performed at each power up.

12.3 Settings memory

KLA actuators memorize the latest settings. Therefore, at each power up, the actuator does not require to be programmed again.

13 Information on disposal of the product

KLA actuators can be stored at a temperature between -20 °C and 60 °C. Furthermore, KLA actuators should be placed at a minimum storage pressure of 750 hPa.

Keep KOMP-ACT's products away from fire, open flame, sparks, lighted electric bulbs or any other sources of ignition.

Do not expose the product to direct sunlight for an extended period of time.

Do not use in a place subject to heavy vibration and/or shock.

Keep unpacked KOMP-ACT products away from untrained persons.

14 Safety warnings

KOMP-ACT SA disclaims liability for any damages caused by improper handling of KOMP-ACT's products, which includes the KLA product line, the electronic controller KDRV-1-MK-X-X and its related end-user interface. KLA electric linear actuators should be used in conjunction with KDRV-1-MK-X-X electronic controller.

Install the product and operate it only after reading the operation manual carefully and understanding its contents. Also, keep the manual in a location where it can be referred to as necessary. By purchasing KOMP-ACT's products, you confirm that you have read and understood the following warnings. Provide the safety notes to your customers if you resell KOMP-ACT products. Inform your customers and employees of the potential hazards.

- Do not operate at pressures, temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)
- If the moving portion of the product will pose a hazard to humans or will damage machinery or equipment, provide a construction that prevents direct contact with those areas.
- For KOMP-ACT's actuators and electronic controller that rely on electricity adopt a countermeasure to prevent the equipment from causing a hazard to humans or damage to the equipment in the event of a malfunction.
- Do not disassemble the product or make any modifications, including additional machining. Doing so may cause human injury and/or an accident.
- Do not mount the product in locations where it is exposed to radiant heat.
- Do not touch and do not put your hand in front of the shaft while the actuator is powered on.
- Under no circumstances may a damaged slider be used further, as this can lead to permanent and non-reparable damage to the stator!
- When manipulating the sliders, hitting them against iron parts, tools, etc. must be absolutely avoided, as this can lead to permanent damage of the slider (surface damage, bending). Further, hitting against other ferrous objects represents a danger of injury (Bruised fingers, etc.).
- KOMP-ACT's electric linear actuators are fast-moving machine parts and can reach temperatures up to 80 °C, which may cause burns upon contact. The user must take all necessary precautions to prevent access during operation. Also, The slider of the KOMP-ACT motors can reach temperature values that can cause burns if touched. The user is responsible for taking all the measures necessary to avoid any contact and the relative danger of injuries to living beings (cover, protection from contact etc.).
- Accumulations of dirt, in particular of ferrous chips (magnetic attraction!) or dry running of the slider can considerably shorten the slider's lifetime.
- KOMP-ACT products are made of precision components including neodymium permanent magnets, which must be handled with due care. An uncontrolled collision between two actuators can damage the interior of the product. A damaged product can lead to severe wear and reduced lifespan. Damaged products should not be reused.
- When handling damaged KOMP-ACT products, gloves and safety glasses should be worn.
- Whether permanent magnets can affect the human organism is a point of dispute. Therapists who use magnets for healing would agree with this, but scientific experiments show that the fields of permanent magnets (Electromagnets are a separate case) are too weak to have any measurable effect on humans. Whether long-term exposure to permanent

magnets is good or bad for the health is not relevant to KOMP-ACT products, since the KLA product line's magnetic field is already weaker than the earth's magnetic field at a distance of 90 mm.

- Due to their permanent magnets, KOMP-ACT products should be kept at a good and safe distance from any devices and objects that can be damaged by magnetism. This includes: TVs, laptops, computer hard drives, credit cards, ATM cards, data storage media, mechanical watches, hearing aids, pacemakers, metallic implants and speakers.
- KOMP-ACT's actuators could affect the functioning of pacemakers and implemented heart defibrillators. If you wear one of those devices keep a distance of minimum 250 mm from KLA product line.

15 Support Contacts

If a problem is still not solved or if you have any question regarding the contents of this end-user manual, please contact us. We will help you with great pleasure.

- Product Engineer: Alexia Vernier, alexia.vernier@komp-act.com
- Product Engineer: Alaa Maghrabi, alaa.maghrabi@komp-act.com

16 Glossary

Accuracy refers to the difference between the position reached (given by the sensing system) and the desired position (set via the web server)

Board and driver both refer to the electronic controller. The three terms are identical in this document.

Repeatability refers to the similarity in terms of stroke positioning attained by repeated measurements under the same conditions.

Slider refers to the actuator's shaft.

Stator refers to the motor part of the linear motor in which the motor windings, position sensors, temperature monitoring and the electronic nameplate are integrated.

Stroke refers to the distance travelled by an actuator in motion.

17 Contact details

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