

Quick guide

Thrust actuator

PLUS 2G



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1.0 Notes on possible dangers

1.1 Significance of symbols



Warning of general danger.



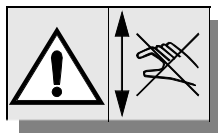
Warning of dangerous voltage.



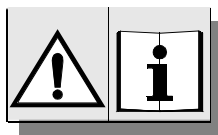
General information.



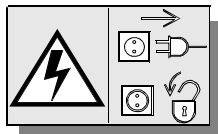
Exposed to injury!
Don't touch the turning handwheel when the motor is running.



Exposed to injury!
Don't put your hand into the up or downwards moving appliance.




Danger when not observing the operating and installation instructions!
Before installing, operating, maintenance or dismantling read and observe the instructions.



Danger though voltage!
Before dismantling the hood, switch of the electrical source and secure against turning on again.

2.0 Storage and transport



ATTENTION !

- Valve mountings such as drives, handwheels, hoods must not be used to take external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear.
Non-compliance may lead to death, injury or damage to property due to persons falling or parts being dropped.
- Suitable materials handling and lifting equipment should be used.
See „3.3 Technical data“.

- At -40 °C to +85 °C dry, free from dirt.

3.0 Description

3.1 Field of application

Plus 2G linear thrust actuators are employed to actuate control or shut-off valves requiring a nominal linear stroke distance.

The intelligent Plus 2G thrust actuator is used whenever the actuator is controlled with an analogue signal (0 to 10 V/4 to 20 mA) or a 3-point signal and feedback information about positions, operating states, faults, etc. has to be output.

3.2 Method of functioning

The actuator has eight parameter switches for programming the most important actuator settings without a PC.

The valve final positions and the type of control are automatically determined by the electronics in an initialization run.

The desired position can be specified by means of the analogue control input. The input is protected against polarity reversal. It can be configured as a current (4 to 20 mA) or voltage (0 to 10 V) input using a switch.

Alternatively, or additionally, the actuator can be controlled by means of a 3-point signal. The electronics have two binary wide voltage inputs for this purpose ($L\uparrow$, $L\downarrow$) for all voltages from 12 V AC/DC to 250 V AC/DC.

The 3-point control signal takes priority over the analogue input signal, e.g. for fail-safe or anti-freeze protection. If a signal is present at both inputs (double control), the control mode is interrupted.

The spindle position is determined by means of non-contacting and non-wearing reflex sensors. The electronics compare the setpoint with the actual value and correct the plug position accordingly.

The speed and positioning time can be varied with a 4-step slide switch.

The electronic detects a wire break in the 4 - 20 mA control signal. The fail-safe behaviour in case of a control signal failure can be set with a 3-step slide switch.

The actual position (position feedback) can be output via the optional analogue output. The output signal is configured as a current or voltage output using the same switch as for the analogue input signal. The output is electrically isolated.

The optional relay card provides four unassigned relay outputs for alarm signals. The contacts are gold-plated.

Type	Plus 2G					
Thrust force	kN	2,2	5,0	12,0	15,0	25,0
Operating speed	mm/s	0,25/0,38/0,47/1,0 adjustable		0,20/0,31/0,38/0,79 adjustable		
Travel distance max.	mm	50		80		
Duty classification acc. to EN 60034-1		S3 - 80 % CDF/max. 1200 c/h (at +70 °C)				
Supply voltage	V	24 V AC/DC				
Motor type		BLDC (Brushless DC motor)				
Power consumption	VA	max. 65				max. 130
		(depends on the operating speed)				
Torque switch		2 pcs. included internally				
Enclosure EN 60529		IP 65				
Max. storage temperature		-40 °C ... +85 °C				
Max. permissible ambient temperature		-20 °C ... +70 °C, for UL/CSA version up to max. +60 °C				
		(For outdoor use and sub-zero temperatures, a heating is recommended!)				
Hand operating device		Yes (always running)		Yes (engageable)		
Operation		optional:- 3-point: 12 V AC/DC to 250 V AC/DC· 0 to 10 V DC load resistance 500 kOhm resolution 12 Bit· 4 to 20 mA DC load resistance 125 Ohm resolution 12 Bit				
Max. cable cross section		Supply voltage: 2,5 mm ² 3 point input: 2,5 mm ² Control signals: 2,5 mm ²				
Mounting position		Any. Exception: motor not hanging downwards				
Cable diameter for cable glands		2 x M16 x 1,5: 5 - 9,5 mm		2 x M16 x 1,5: 5 - 9,5 mm 1 x M20 x 1,5: 8 - 13 mm		
Electrical safety according to DIN EN 61010, part 1		Overvoltage category II Pollution degree 2 Altitude up to 2000 m Rel. humidity ≤ 90 % non-condensing				
Characteristics at control signal failure		adjustable with slide switch: AUF, STOP, ZU				
Gear lubricant		Klüber Isoflex Topas NB152		Klübersynth G34-130		
Weight	kg	5,4		9,5		11

4.0 Installation



ATTENTION !

- Work on electrical systems or equipment must only be carried out by qualified electricians or by trained individuals under the guidance and supervision of a qualified electrician in compliance with regional electrical safety requirements and regulations.
- When connecting the thrust actuator the supply line must be disconnected from the mains (not live) during connection work. It must be impossible to switch the power on unintentionally while the mains are disconnected in this way. Failure to comply may result in death, serious injury or substantial damage to property.
- Valve mountings such as drives, handwheels, hoods must not be used to take external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear.
Non-compliance may lead to death, injury or damage to property due to persons falling or parts being dropped.
- Actuator components which rotate or move during operation are coloured red.
Crushing and injury hazard!

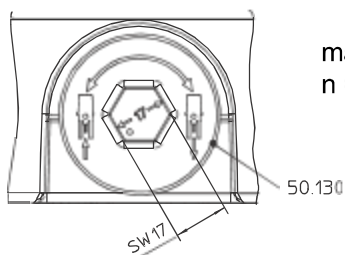
4.1 Manual operation



ATTENTION !

- The manual operating device always rotates during motor-driven operation (running indicator). Never activate the manual operating device while the motor is running.
Injury hazard!
- In the manual operating mode pay careful attention in the final positions that the manual operating device is only turned to the point where the torque switch trips (audible click) as otherwise damage will be caused to the thrust actuator!

Plus 2G 2,2 - 5 kN



max. rpm !
n = 300 U/min

50.130

SW 17

4.2 Installation instructions for mounting to valves

A Mount adapter parts

Setting dimension (Y) and fitting-projection (X) are measured with inserted valve spindle!

2-way:



3-way:



ATTENTION !

connecting thread up to M16:

X = 60/83 mm → Y = 102 mm (+2 mm)

X = 98 mm → Y = 116 mm (+2 mm)

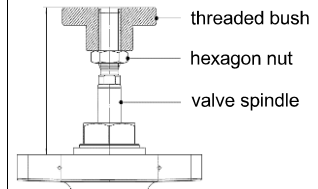
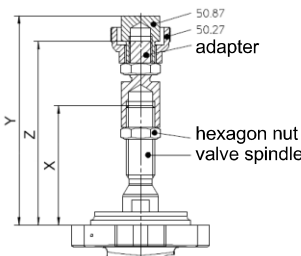
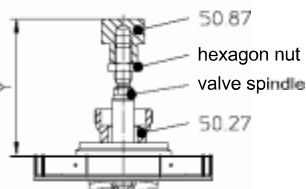
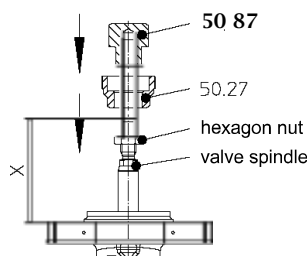
with adapter from M20 to M16:

X = 60/83 mm → Z = 128 mm → Y = 146 mm

X = 98 mm → Z = 143 mm → Y = 161 mm

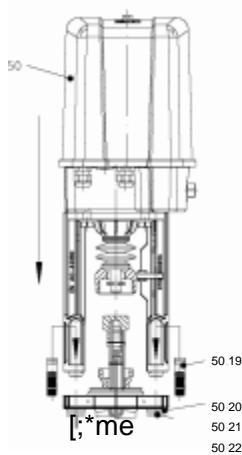
threaded bush 25kN:

X = 83/98 mm → Y = 98 mm

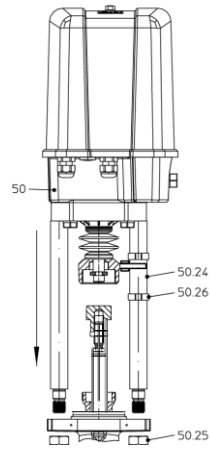


B Place actuator onto valve

a Yoke version

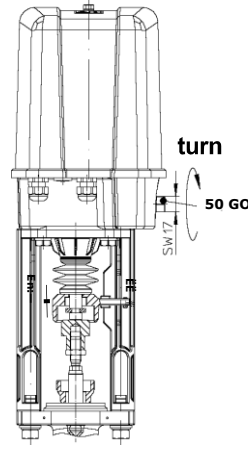


b Column version

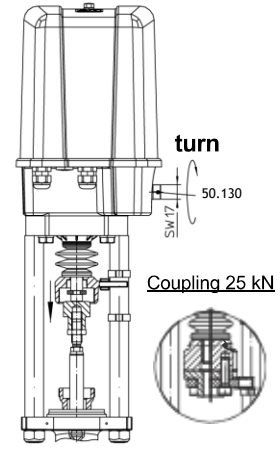


C Drive actuator spindle onto valve spindle

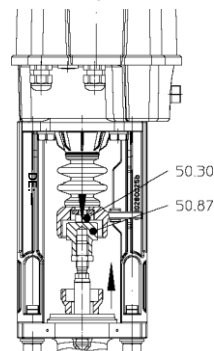
a 2,2 - 5 kN



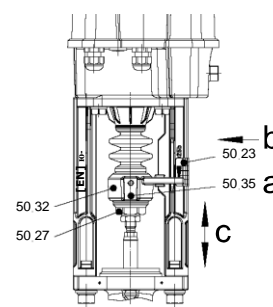
b 12 - 15 kN



D Screw the coupling



E Secure coupling in place with grub screw (a), clip lift dial (b) and position it (c)



4.3 Electrical connection

4.3.1 Wiring diagram -Plus 2 G 2,2 - 25 kN

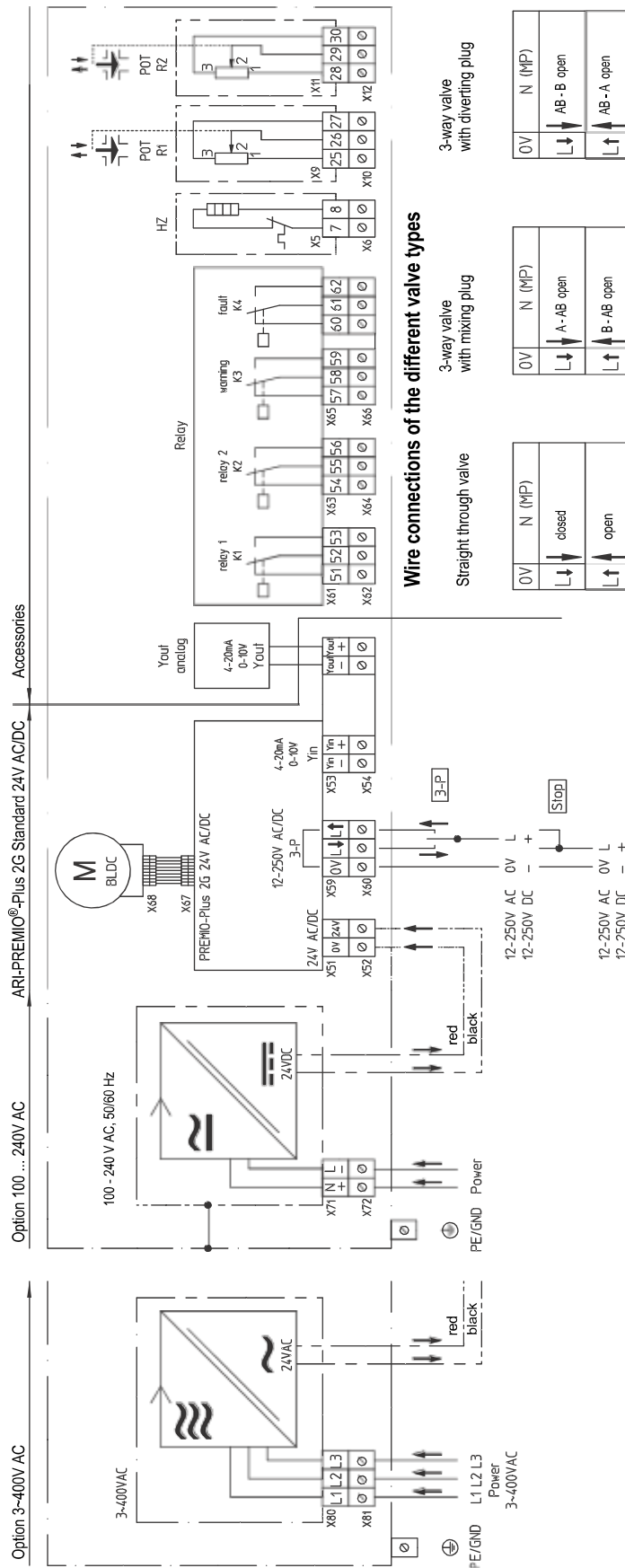


Fig. 1

4.3.2 Connection



ATTENTION !

- Work on electrical systems or equipment must only be carried out by qualified electricians or by trained individuals under the guidance and supervision of a qualified electrician in compliance with regional electrical requirement and regulations.
- When connecting the electronics the supply line must be disconnected from the mains (not live) during connection work. It must be impossible to switch the power on unintentionally while the mains are disconnected in this way. Failure to comply may result in death, serious injury or substantial damage to property.
 - The mains voltage must coincide with the values indicated on the rating plate.
 - Never touch live parts while carrying out adjustments!
 - Exercise particular caution when working with voltages higher than 24 V!
 - Never insert or withdraw modular isolating terminals that are still live!
 - Only one actuator can be connected.
 - The actuator lift range must not be overtravelled when carrying out adjustments; risk of damage.
 - Make sure the motor connected in the actuator is switched off in the final positions according to the travel or torque.

- A separator in the system for disconnecting the actuator from the mains should be located nearby and easily accessible.
- For flexible cables: Use ferrules according to DIN 46228.
- Single conductors with safety extra-low voltage (< 50 V) must be laid/fastened into the actuator separately from single conductors with low voltage (50 - 1000 V) or they must be separated by reinforced insulation.
- Single conductors must be bundled per connector strip directly behind the terminal with a cable tie, so that a loosened cable cannot get to other parts/circuits.

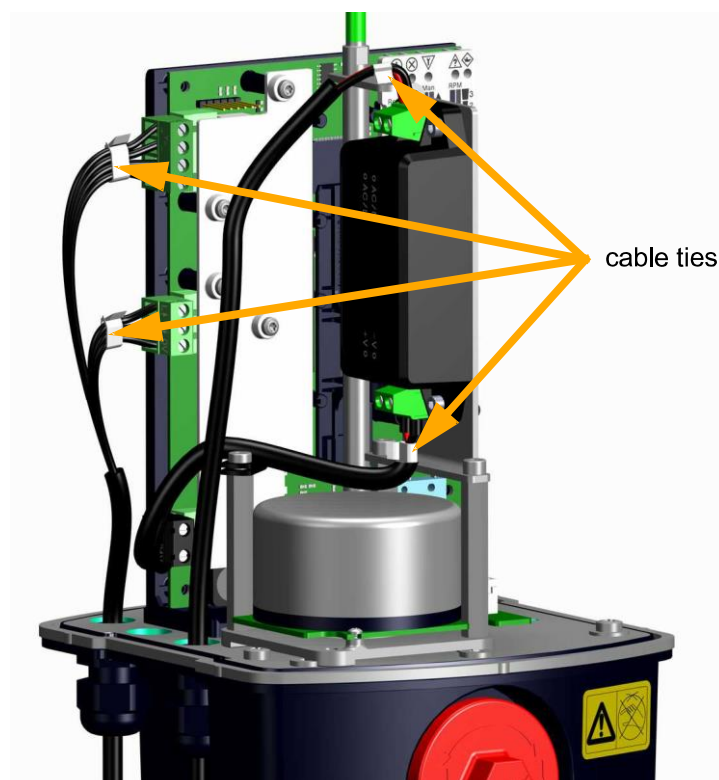







Fig. 2: Single conductors with cable ties

4.4 Settings - Handling

4.4.1 Display and operating elements of the standard electronics

<p>The diagram shows a control panel with several sections. Callout 1 points to a row of four LEDs at the top. Callout 2 points to a vertical RPM scale with four positions (0, 1, 2, 3). Callout 3 points to a 'Reset' button and an 'Init > 4s' indicator. Callout 4 points to a 'Man' (Manual) button. Callout 5 points to a 'Fail-safe' section with three switches: 'Force', 'Anti-block', and 'Eco-nomy'. Callout 6 points to a 'Y' section with two switches: '0...10V' and '4...20mA'. Callout 7 points to a 'Fail-safe' section with three switches: 'On' and 'Off' for 'Force', 'Anti-block', and 'Eco-nomy'.</p>	Pos.	Description			
	1	LED's for status-information			
	2	<i>Motor speed</i>		<i>2,2/5,0 kN</i>	<i>12/15 kN</i>
		3	2600 U/min	1,00 mm/s	0,79 mm/s
		2	1250 U/min	0,47 mm/s	0,38 mm/s
		1	1000 U/min	0,38 mm/s	0,31 mm/s
	0	660 U/min	0,25 mm/s	0,20 mm/s	
3	Local operation				
	<ul style="list-style-type: none"> • UP, STOP, DOWN • AUTO: actuator follows the control signals 				
4	Button to Reset the electronic start/cancel the initialization				
5	LEDs blink for driving in direction up or down. Steadily light in the end position.				
6	Configuration of the analogue control signal				
	<ol style="list-style-type: none"> 1. current / voltage 2. inversion of the analogue signal (input and output) 3. FAILSAFE-position at control signal is loss 				
7	Functions of the actuator				
	<ol style="list-style-type: none"> 1. tight closing function 2. Anti-Block function 3. Economy - reduce the wear 				

4.4.2 LEDs

LED	Colour	Meaning	Description / explanation
	Green	Power	The electronics are connected to the power supply
	Red	Failure	The actuator cannot reach the setpoint/desired position
	Orange	Function check	Blockage, manual mode (handwheel or slide switch)
	Yellow	Out of specification	This LED lights up if the following parameters are exceeded: - CDF (cyclic duty factor) - Temperature range - Blinking during the initialization run
	Blue	Maintenance	Trip slide is dirty - Please clean

4.4.3 LED-error codes

					
uninitialized	green	red			
blocking	green	red	orange		
missing Y_{in} signal	green	red		yellow	
travel range exceeded	green	red	orange	yellow	
position cannot be achieved	green	red	orange		blue
too small valve stroke	green	red	orange	yellow	blue
motor error	green	red			blue

4.5 Options

4.5.1 Relay card

4.5.1.1 Operating principle

The relay card is a digital expansion module for the -Plus 2G control electronics. It has four relays for signalling system states and positions digitally to a higher-level control or for connecting relays 1 and 2 to local power consumers (pumps, butterfly valves, etc.).

Two buttons are provided for programming two positions. If a position is overtravelled, the corresponding travel-dependent relay is switched.

The switching states of the travel-dependent relays are indicated by two LEDs.

Relay	Function	Corresponding LED
1	Programmed position is overtravelled upwards	Red "Up" LED on the relay card
2	Programmed position is overtravelled downwards	Red "Down" LED on the relay card
3	Warning	Orange, yellow or blue LED on the motherboard
4	Failure	Red LED on the motherboard



NOTE !

The Failure relay is **switched (high) in normal operation**.

If a fault occurs, the relay drops out to enable a mains voltage or electronics failure to be signalled as well.

The relays are not switched if the handwheel is adjusted or an initialization run is started.

4.5.1.2 Installation procedure

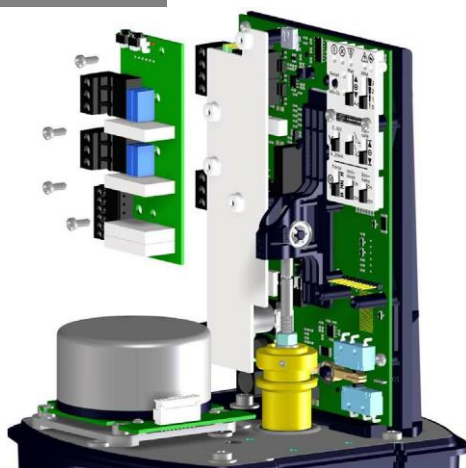
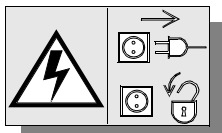


Fig. 3

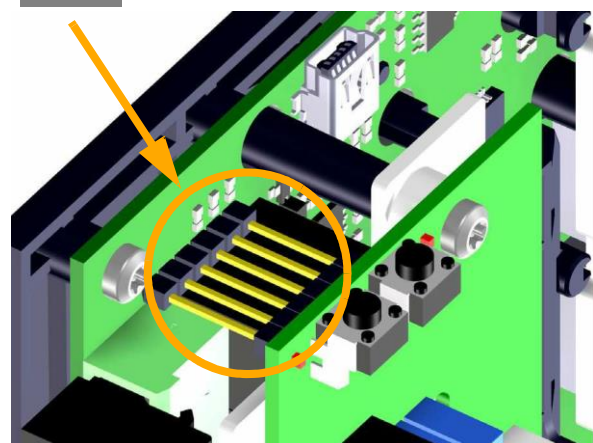


Fig. 4

$Y_{out} = Y_{in} !$

4.5.1.3 Operation – Programming / clearing positions

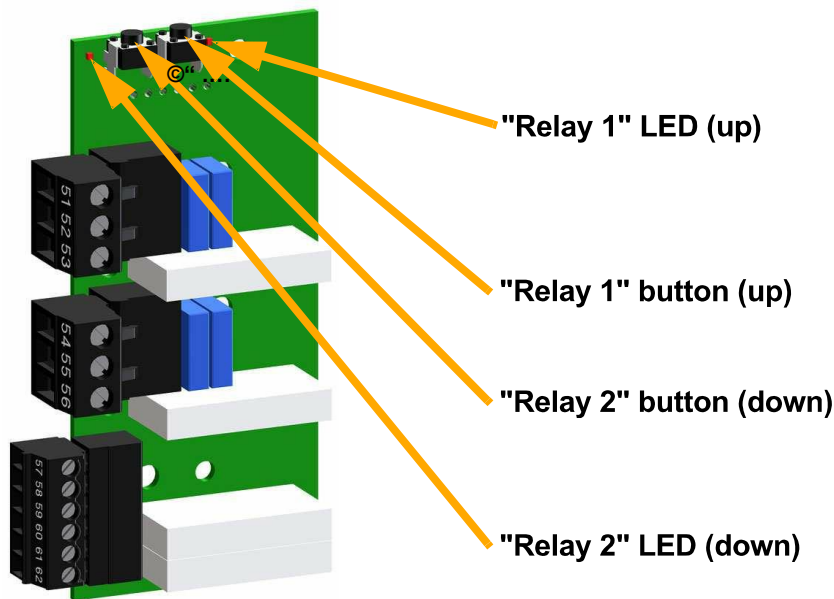


Fig. 5

Programming	Procedure
Relay 1	<ul style="list-style-type: none"> - Approach the spindle position. - Press "Relay 1 button (up)" until the corresponding LED blinks once. - From now on, relay 1 is switched to "active" when the current position is overtravelled in the UP direction.
Relay 2	<ul style="list-style-type: none"> - Approach the spindle position. - Press "Relay 2 button (down)" until the corresponding LED blinks once. - From now on, relay 2 is switched to "active" when the current position is overtravelled in the DOWN direction.
Clear	<ul style="list-style-type: none"> - Press "Relay 1 button (up)" AND "Relay 2 button (down)" simultaneously for longer than one second - Both LEDs blink once to confirm the new setting. - From now on, the two relays are no longer switched.
Overwrite	<p>Similar to Prog. Rel.1 or Prog. Rel.2. The new position automatically overwrites the old position.</p>
Test	<p>Move the spindle to and fro with any type of control (e.g. MAN switch) and watch the LEDs.</p>

4.5.2 Analogue output card - Y_{out}

4.5.2.1 Operating principle

The actual position of the driving spindle can be signalled with the analogue output card.

The connector for the output signal is already mounted on the motherboard.

The feedback signal (4 to 20 mA, 0 to 10 V or inverted) corresponds to the switch configuration on the motherboard (standard product).

The output signal can be changed with a solder jumper irrespective of the switch setting and the input signal which is present (from SW \geq 3.5.0)

The characteristic correction function has **no effect** on the output signal.

4.5.2.2 Installation procedure



Fig. 6



Fig. 7

4.5.2.3 Electrical connection

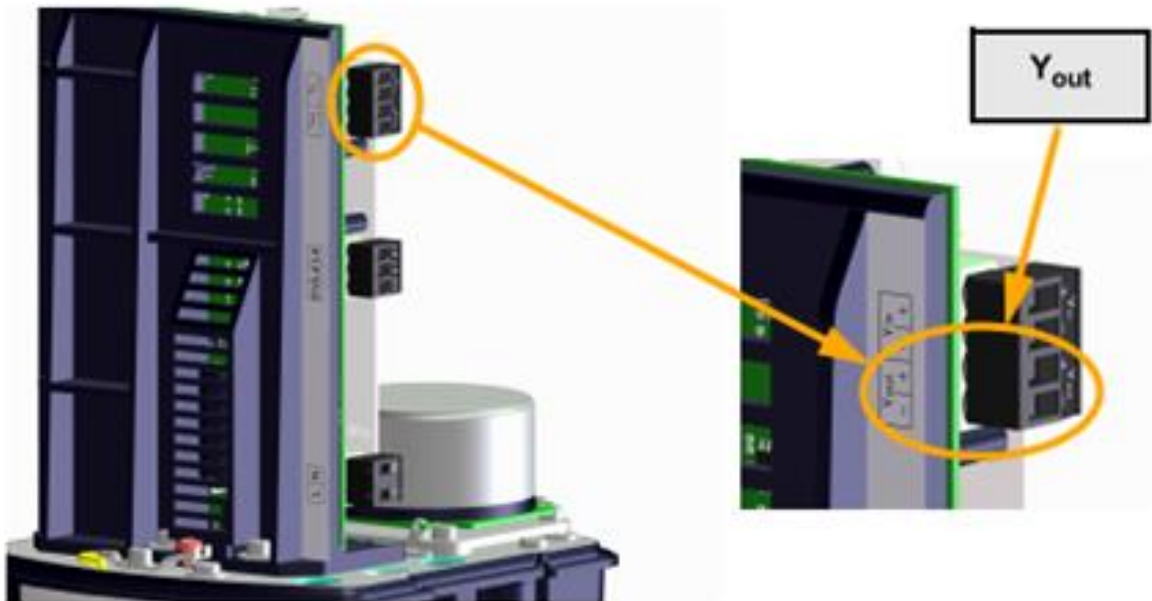


Fig. 8

4.5.2.4 Setting

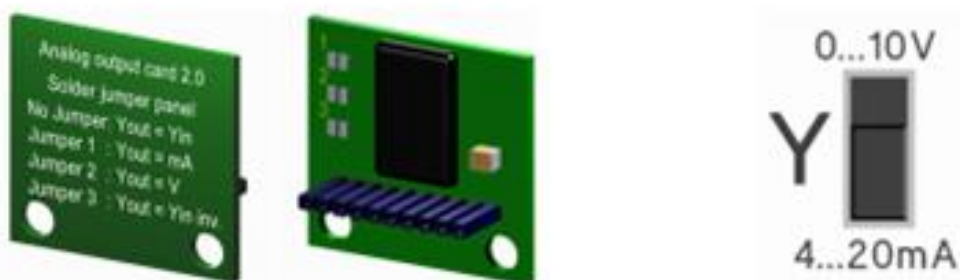


Fig. 9

4.5.3 Communications package

4.5.3.1 Operating principle

A wireless connection to a mobile device can be established via the interface using the BT module. You can then display status information or select special functions. The myPREMIO app is required for this purpose. The module includes analogue position feedback. The BT module can be switched on or off with the ON / OFF switch. Position feedback is always active.

4.5.4 Bus systems - ANYBUS-Module

4.5.4.1 Operating principle

-Plus 2G actuator can be equipped with an ANYBUS module from software version 3.5.0. ANYBUS modules are available for many different bus systems such as Profibus DP, Modbus RTU, etc.

The actuator can be controlled, and (diagnostic) data exchanged with the control system, by means of the various bus systems.

The parity, e.g. for the Modbus, the bus address and the bus termination resistance are set by means of DIP switches on the ANYBUS module.

Please ask ARI-Armaturen for the address assignment for your particular bus system.

4.5.4.2 Installation procedure

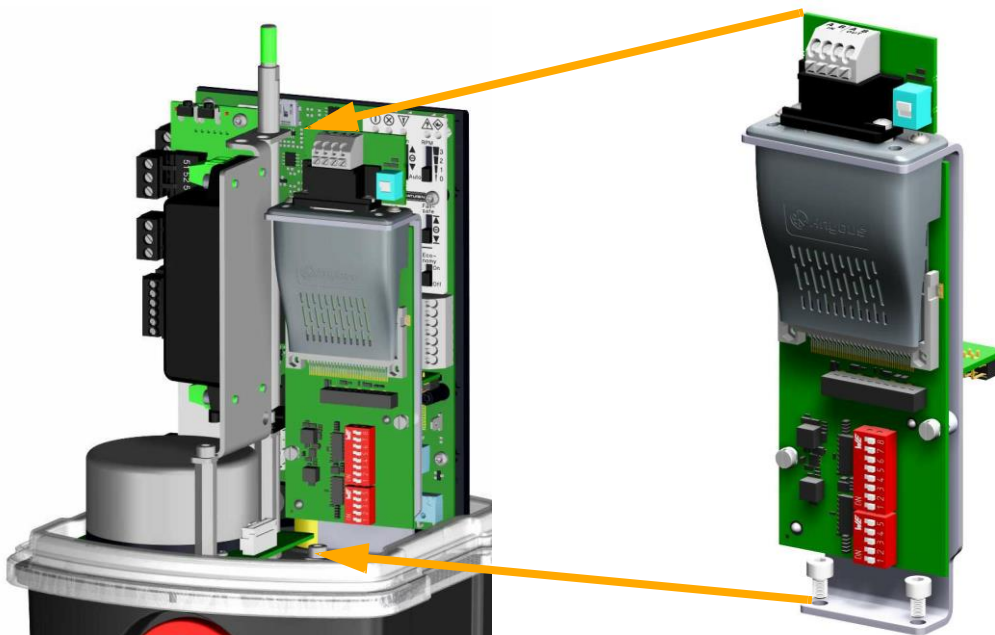


Fig. 10

4.5.5 Heating

A heating resistor should be fitted as a means of protection against the formation of condensation water in cases involving widely varying ambient temperatures, high atmospheric humidity (outdoor use) and temperatures below the freezing point. The heating resistor is self-regulating so that a continuous supply of current merely needs to be connected up.

4.5.5.1 Installation of heating.

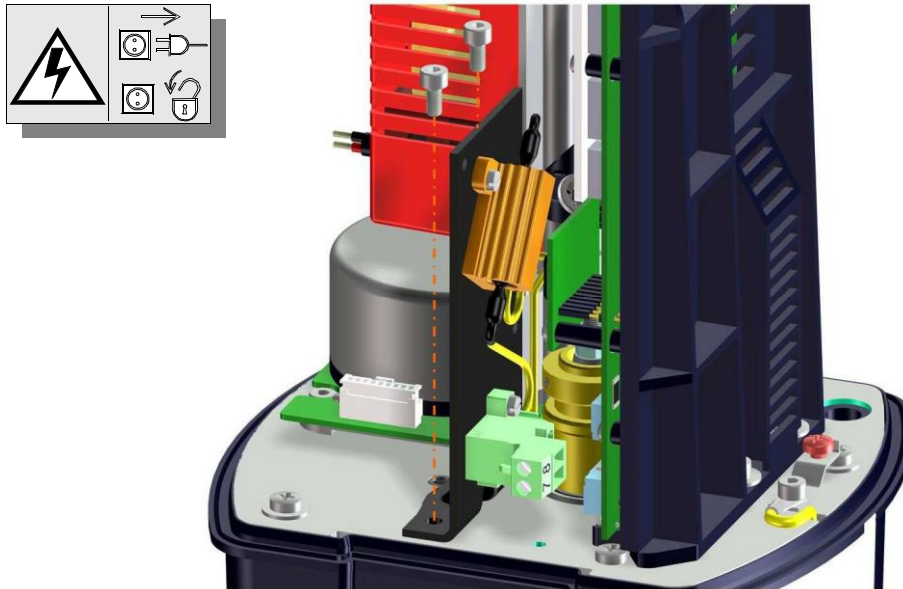


Fig. 11: Heating installation -Plus2 G 2,2- 25 kN

4.5.6 Power supply

4.5.6.1 Installation and connection of the power supply



Fig. 12: Installation and connection of the power supply -Plus 2G 2,2 - 5 kN



Fig. 13: Installation and connection of the power supply -Plus 2G 12 - 15 kN

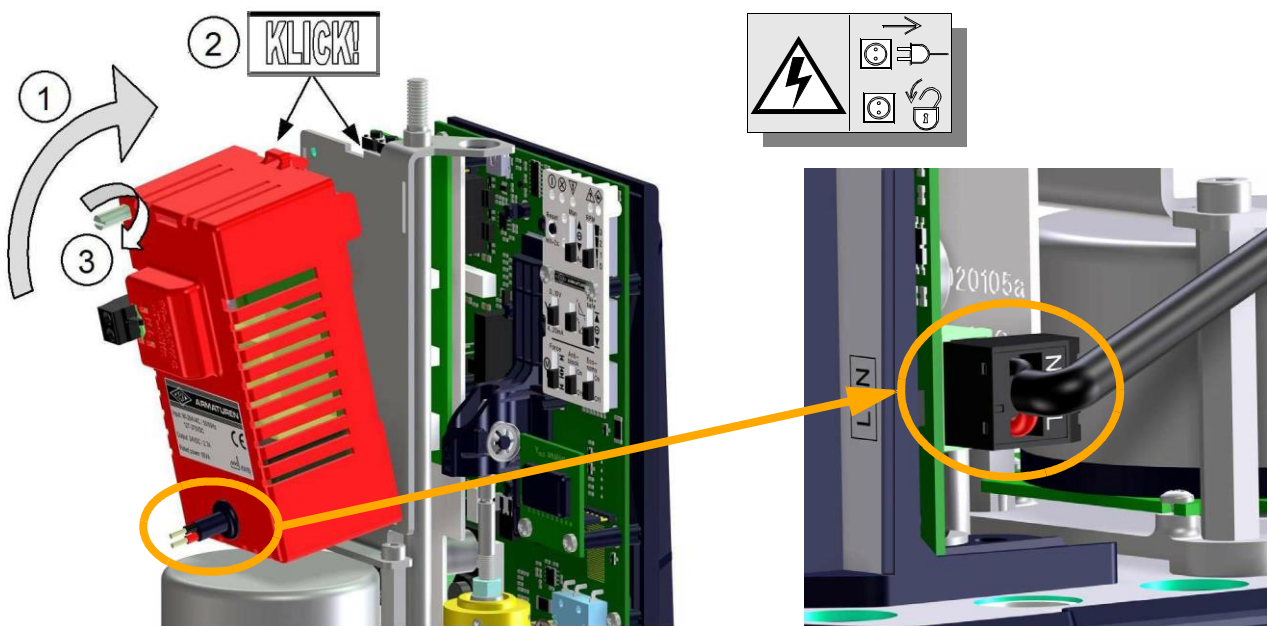


Fig. 14: Installation and connection of the power supply -Plus 2 G 9 kN fail-safe function and -Plus 2 G 25 kN

4.5.6.2

4.5.7 LED-Status Indicator

4.5.7.1 Installation of LED-Status Indicator

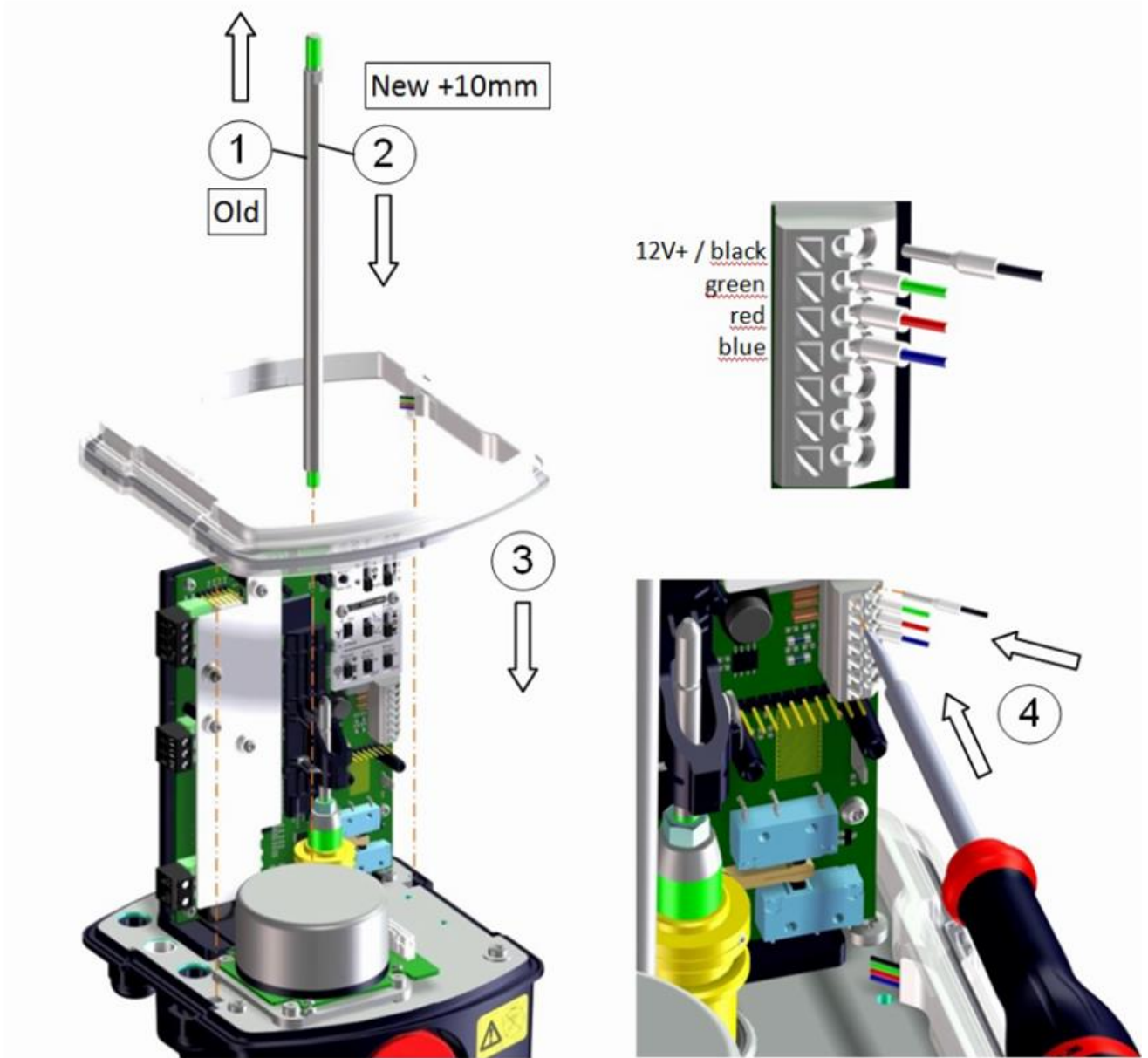


Fig. 15: Installation and connection of the LED-Status indicator

5.0 Putting the actuator into operation



ATTENTION !

All local safety instructions must be observed!

Before putting a new plant into operation or restarting a plant after repair or modification, always make sure that:

- The power supply, control signal and ambient temperature coincide with the technical data of the electronics.

- All work has been completed correctly!

The hood is mounted again following the completion of the adjustment work!

Terminal block	Control panel	Procedure
		<ol style="list-style-type: none"> connect the control signal: <ol style="list-style-type: none"> 0 - 10 V or 4 - 20 mA on plug (Yin + -) and / or 3-point signal on plug (0V, L↑, L↓) set the type of signal on the slide switch: 0..10 V or 4..20 mA 24 V AC/DC connect the power on plug (N, L) start initialization: Press the reset button until the motor starts (approx. 10 s).

6.0 Care and maintenance



NOTE !

The power supply cable must be disconnected from the mains (i.e. deenergised) prior to cleaning the electronics. Suitable precautions must be taken to prevent the mains voltage from being re-connected inadvertently.

Non-observance can result in death, severe personal injury or substantial property damage.

The thrust actuator requires very little maintenance. Accordingly maintenance in specified intervals is not necessary.

Remove any externally visible dirt from the actuator and the electronics occasionally, depending on the operating conditions.

No liquid must be allowed to come into contact with or get inside the electronics!

Never clean the actuator using liquids or aggressive solvents or agents that are detrimental to health or highly flammable.

We recommend dampening a cloth with cleaning agent to clean the actuator rather than applying it directly.

7.0 Troubleshooting

In the event of malfunction or faulty operating performance check that the installation and adjustment work has been carried out and completed in accordance with these Operating Instructions.



ATTENTION !

- It is essential that the safety regulations are observed when identifying faults.

If malfunctions cannot be eliminated with the help of the following table „8.0 Troubleshooting table“, the supplier or manufacturer should be consulted.

8.0 Troubleshooting table

Fault	Possible causes	Remedy
Green LED does not lit	Power failure	Check the mains power supply
	Operating voltage is incorrect	Connect the operating voltage indicated on the rating plate
	Electronics have burnt out	Make sure the mains voltage coincides with the value indicated on the rating plate. Replace the electronics.
	Terminal not connected correctly or cable does not make proper contact inside terminal	Insert the terminal securely and check the connecting cable
Actuator starts briefly, then stops and starts again briefly	CDF management is active due to internal overheating	Protect against radiated heat, lag the pipes
Actuator stops for 15 s or does not respond to control signals for 15 s	Actuator has detected a handwheel movement	The motor is not started for another 15 s for safety reasons
4 to 20 mA input signal cannot be set on controller or setpoint selector	ARI-PREMIO®-Plus 2G electronics have no power	Check the power supply to the electronics
Initialization cancelled; red and yellow LEDs lit	Outside the valid travel range	Possible causes: Incorrect fitting projection (refer to point 4.2 Installation instructions for mounting to valves), incorrect column length, valve missing
Red LED lit	Actuator not initialized yet.	Start an initialization run after mounting the actuator on a valve and connecting the control signal
No values or incorrect values at analogue output	Parameter settings are incorrect	Set the parameters as described in 4.5.2.4 Setting
	Analogue output card missing or defective	Replace the analogue output card
Actuator oscillates continuously about a point	Proportional action Xp setting on controller is too low	Increase the Xp value (refer to the controller Operating Instructions) or set the ECONOMY switch to ON
	Dead band setting on controller is too low	Increase the dead band value (refer to the controller Operating Instructions) or set the ECONOMY switch to ON
	Dirty slide	Clean surface with Greyscale (black/white)

Fault	Possible causes	Remedy
Actuator cannot be controlled with analogue control signal	Actuator is set to 3-point operation or is currently controlled by a 3-point signal. Recognizable by a glowing LED nearby of the 3-point connector.	By withdrawing the connector for the 3-point signal, you can determine whether the actuator is set to 3-point operation or whether it is simply being controlled by a 3-point signal. If the LED goes out, a 3-point signal is present, e.g. from an anti-freezing contact. If the LED is still lit, the actuator is set to 3-point operation. An analogue control signal must be present during the initialization run in order to control the actuator with an analogue signal! Repeat the initialization with an analogue control signal applied.
	Switch is set to manual instead of auto.	Set switch to auto.
Actuator not moved into end position by 0 V control signal (control with 0 to 10 V control signal)	There is AC voltage due to induction voltages on the control signal	<ul style="list-style-type: none"> - Don't lay the signal line directly adjacent to main lines - Use shielded cables for the control signal - Connect a 100 µF to 470 µF capacitor parallel to the signal input
	There is AC voltage (approx. 8,5 V for a 0 V control signal) at the signal input if a common ground is used for the control signal and the 24 V AC power supply (three-wire). This could be due to a wiring error in the 24 V AC power supply for the signal source (e.g. controller)	Check the polarity of the 24 V AC power supply for the signal source (e.g. controller) and if necessary reverse it
	The internal resistance of the signal source, e.g. a controller or PLC, is too high. The measuring voltage for detecting cable breaks no longer collapses completely	Connect a 1000 Ohm resistor parallel to the Yin input. Note: The 1000 Ohm resistor should be installed immediately downstream of the signal source to ensure that the actuator's cable break detection function works correctly

