

## VA1000. Series Self-Calibrating, Force Controlled Electric Valve Actuator

### Introduction

The VA1000 non-spring return actuator with 1000N thrust for valves in heating, ventilation and air conditioning applications is available for floating (3-point) control or proportional control.

All models have manual override as standard and provide stroke capabilities of 7 mm to 25 mm. Proportional models are self-calibrating. The actuator is intended for use with Johnson Controls VG7000 and VGS8...threaded valves as well as VG9000 and VG8000 flanged valves.

All valves should be fitted in accordance with the maximum close-off pressure ratings specified (see pertinent valve product bulletins). Valve-actuators can be ordered as separate units or as a factory fitted valve / actuator combinations.



**VA1000.**

### Features and Benefits

<input type="checkbox"/> <b>Proportional actuators are self calibrating.</b>	Easy, quick and precise commissioning and servicing means cost savings.
<input type="checkbox"/> <b>Force controlled motor shut-off.</b>	Ensures that the maximum thrust has been achieved.
<input type="checkbox"/> <b>Manual override as standard.</b>	Allows manual positioning independent of the power supply on all models.
<input type="checkbox"/> <b>Unique swing-gate yoke.</b>	Allows lateral mounting of the actuator reducing the vertical space over the valve needed for installation.
<input type="checkbox"/> <b>IP54 enclosure protection.</b>	Allows installation in a wide range of environments.
<input type="checkbox"/> <b>Delivered with fitted 1.5 m cable.</b>	Saves time and protects actuator during installation.
<input type="checkbox"/> <b>Status LED.</b>	Visual actuator status monitoring.
<input type="checkbox"/> <b>Models with optional aux. switches or 2 kΩ feedback potentiometer.</b>	Provides potential free contacts for user availability or independent monitoring of the actuator's status.
<input type="checkbox"/> <b>Control-Signal failure - stem to pre-determined position.</b>	Actuator pre-set position after a control signal failure (extended/retracted), is selectable in-situ.
<input type="checkbox"/> <b>Stroke position indicator.</b>	Automatic adjustment of stroke indicators at the start of the first cycle.

## Ordering data

Code No.	Actuator Description
<b>Threaded coupler</b>	
<b>Floating Control</b>	
VA1000.2	230 V AC
VA1000.1	24 V AC
VA1000.1S	24 V AC, 2 Aux. switches
VA1000.1P2	24 V AC, 2k $\Omega$ Feedback pot.
<b>Proportional Control</b>	
VA1000.1M	24 V AC 0(2)...10 V DC or 0(4)... 20 mA
VA1000.1MS	24 V AC 2 Aux. switches 0(2)...10 V DC or 0(4)... 20 mA
<b>Clamp coupler</b>	
<b>Floating Control</b>	
VA1000.2	230 V AC
VA1000.1	24 V AC
VA1000.1S	24 V AC, 2 aux. switches
VA1000.1P2	24 V AC, 2k $\Omega$ Feedback pot.
<b>Proportional Control</b>	
VA1000.1M	24 V AC 0(2)...10 V DC or 0(4)... 20 mA
VA1000.1MS	24 V AC 2 Aux. switches 0(2)...10 V DC or 0(4)... 20 mA

## Ordering procedure

The actuator can be ordered as a separate unit or a factory fitted valve-actuator combination. Should the latter be requested, please just add "+M" to the end of the actuator ordering code.

### For example:

Item 1 **VGS8F1W1N** (valve body)  
Item 2 **VA1000.2** (actuator)

Alternatively, to order a factory fitted combination.

Item 1 **VGS8F1W1N** (valve body)  
Item 2 **VA1000.2+M** (actuator)

## Actuator / valve combinations

The **VA1000.** with threaded coupler can be combined with the following valve range:

### ● VG1000 series

PN 16 Female and male threaded valves

VG1  T **SS Trim DN 15...50**  
**Brass trim DN 25...50**

The **VA1000.** with clamp coupler can be combined with the following valve ranges:

### ● VGS8... Series

PN 16 Male threaded valves

VGS8  W1N **Mixing DN 15... 50**

### ● VG9000 series

PN 6 and PN 10 Flanged valves

VG9  S1 K **All body types DN 15...50**

VG9  S1 L **All body types DN 15...50**

### ● VG8000 series

PN 16 flanged valves

VG82  V1N **2-way PDTTC (NO) DN 15...40**

VG88  V1N **3-way mixing DN 15...40**

VG82  S1N **2-way PDTTC (NO) DN 15...40**

VG88  S1N **3-way mixing DN 15...40**

VG89  S1N **3-way diverting DN 15...40**

PN 25 flanged valves

VG82  S1H **2-way PDTTC (NO) DN 15...40**

VG88  S1H **3-way mixing DN 15...40**

VG89  S1H **3-way diverting DN 15...40**

# Operation

## Floating models

Connections	Actuator Stem
1-2	Extends
1-3	Retracts

No stroke adjustment is necessary due to the automatic force control.

### Feedback output 0÷2 kΩ - Fig. A

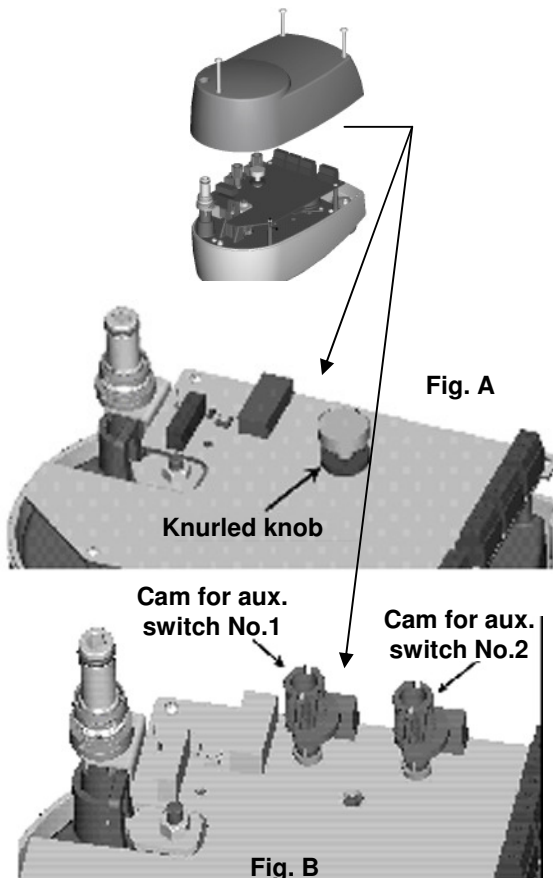
The factory setting is 50 Ω - 100 Ω when the stem is fully retracted.

To change the setting, the feedback signal is adjusted with the plastic knurled knob shown in figure A below.

- Move the valve stem to the fully extended position and adjust potentiometer until 20-40 Ω can be read on ohmmeter (terminal 22 and 21 in the wiring diagram).
- Move the valve stem to the fully retracted position and read the potentiometer value.
- Calculate the average resistance value.
- Move the valve stem to centre stroke position and adjust the potentiometer to the calculated average resistance value.

### Auxiliary Switch settings

The auxiliary switches can be set by adjusting the cams seen in figure B.



## Proportional models (0(2)...10 VDC or 0(4)...20 mA)

The VA1000. provides a proportional stroke corresponding to the control signal.

Following control signals are defined as standard:

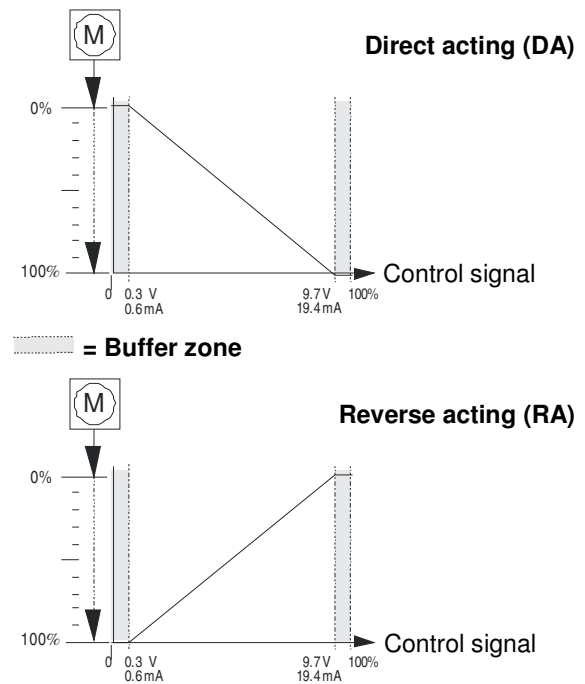
- 0...10 V DC
- 2...10 V DC
- 0...20 mA
- 4...20 mA

Action (DIP switch set)	Input control signal	Actuator Stem	position at control-signal failure *
Direct (DA)	Increases	Extends	Selectable*
	Decreases	Retracts	Selectable*
Reverse (RA)	Increases	Retracts	Selectable*
	Decreases	Extends	Selectable*

\* "Control signal failure" position pre-set does not operate when 0...20 mA control is selected.

The action mode, **DA** (direct acting) and **RA** (reverse acting) is set through the DIP switches (see paragraph "**DIP switch settings**" on page 5).

The actuator control signal has a buffer zone, at each end of the span, of 0.3 V (0.6 mA). This ensures definite valve close-off.



**Note:** When ever the actuator is newly placed on a valve, auto-calibration must be carried out.

### Control signal failure pre-set position

(not functional with 0...20 mA control selected)

A control-signal failure on proportional models will cause the actuator to automatically move the stem to a (via DIP-switch) pre-selected position (100% extended or 100% retracted).

### Auto Calibration - Preset Signal Ranges

(DIP SWITCH 3 = OFF)

To change the Factory Default parameters the control input signal parameters can be selected by means of a DIP switch (see "DIP switch setting" on page 5). The standard control signals are selected by setting DIP switches 2, 3 and 4 (see "DIP switch settings" on page 5).

It is recommended that the desired actuator control signal and action be set before fitting to the valve. Power must be connected before the auto-calibration cycle can be started. The LED is illuminated green when the power is ON.

#### Procedure:

Condition: Actuator already mounted on valve.

To start the auto calibration cycle push and hold the button for at least 3 seconds (see figure C). The LED flashes rapidly during the entire procedure. The actuator will make one full cycle to detect the stem extended and retracted limits. The end stroke indicators are automatically placed at the stroke limits. When the procedure ends, the actuator switches back to its operating mode and reaches the position corresponding to the input signal value. The LED shows steady green when the position is reached.

If the control-signal changes the actuator stem will move to the new position. During stem movement the LED flashes green.

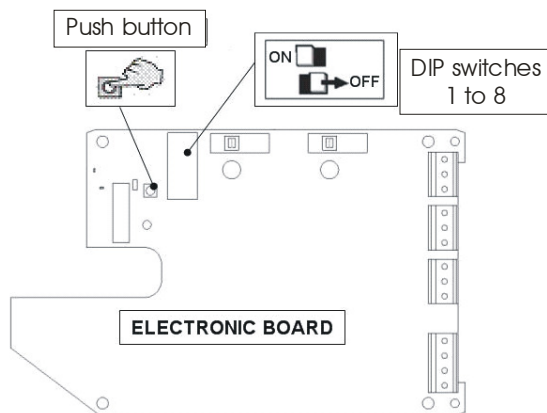


Fig. C

### Auto Calibration - Custom Signal Ranges

(DIP SWITCH 3 = ON)

(Max range limits 0...10 V DC or 0...20 mA)

#### Procedure:

Condition: Actuator already mounted on valve.

To start the auto calibration cycle push and hold the button for at least 3 seconds (see figure C). The LED flashes rapidly during the entire procedure. The actuator will make one full cycle to detect the stem extended and retracted limits. The end stroke indicators are automatically placed at the stroke limits. The actuator will make a full cycle to detect the stem extended and retracted limits and the end stroke indicators automatically pushed to the stroke limits. Enter the desired signal range while the actuator performs the auto calibration. Enter the desired parameters as follows:

- Set the **Minimum input signal** (start-point), which can be from **0...6 V DC** (0...12 mA) and confirm by pressing the button (see figure C).
- LED illuminates a steady green for 2 sec. indicating correct entry.
- If the LED illuminates a steady yellow for 2 sec., an incorrect setting is indicated and must be re-entered.
- Set the **Maximum input signal**, which can be from **3...10 V DC** (6...20 mA) and confirm by pressing the button (span min. = 3 V DC or 6 mA).
- LED illuminates a steady green for 2 sec. indicating correct entry.
- If the LED illuminates a steady yellow for 2 sec., an incorrect setting is indicated and must be re-entered.

The Maximum input signal is the control span plus the minimum input signal (start-point).

**It is only possible to make one correction after which the actuator will leave the calibration cycle.**

After making the correcting entry and confirming, the LED will illuminate green steadily for 2 sec. to indicate correct setting. If the LED illuminates a steady yellow for 2 sec. this indicates that the second entry is also erroneous and the calibration cycle will automatically abort. To restart the auto calibration cycle, push and hold the button for at least 3 seconds and repeat the procedure from the beginning.

When the procedure is finished the actuator returns to its operating mode, reaching the position corresponding to the input signal value, the LED will illuminate a steady green.

If the control-signal changes the actuator stem will move to the new position. During the stem movement the LED flashes green.

#### Position feedback

The position feedback signal is 0...10 V DC or 2...10 V DC signal and could feed an external supervisory system.

**Manual override**

When the crank is pushed into the hexagonal opening power is interrupted and manual operation is engaged. Turning the hand crank clockwise extends the stem and counter-clockwise retracts the stem. Pushing the hand crank down again disengages the manual operation and reconnects the power.

**D**IP switches settings  
(Proportional models only)

DIP switch	Description	Status
1	Control	ON = 3/2 point 4 wires
		OFF = Proportional
2	Input signal	ON = Current
		OFF = Voltage
3	Input signal range	ON = Custom
		OFF = Pre-set
4		ON 2...10V 4...20 mA
		OFF 0...10V 0...20 mA
5	Action	ON = Reverse Action
		OFF = Direct Action
6	Pre-set signal-fail position*	ON = Extended
		OFF = Retracted
7	Stroke time	ON = 3s/mm
		OFF = 6s/mm
8	Not used	- -

**Note:** \* Does not operate with 0...20 mA control.

**Normal operating mode**

The actuator position is shown by the end stroke indicators on the yoke.

The LED flashes green while the actuator is moving.

The LED illuminates a steady green when the actuator is at rest.

**Actuator status indication**

The actuator microprocessor carries out a failure diagnosis when a failure has been detected. The actuator status is indicated by the LED. When the microprocessor detects that the stem has come to an unexpected stop it initiates a retry cycle, this is repeated three times and if unsuccessful the actuator status switches to fault mode, the LED flashes yellow and the feedback signal is no longer reliable. If the problem is cleared actuator continues normal function.

**LED warnings**

Status	LED colour		
	Red	Green	Yellow
On	Generic fault	Power on, motor at rest	Indicates 2nd incorrect custom setting
		For 2s confirming correct entry during custom setting	For 2s indicating 1st incorrect custom setting
		NA for 3p/2p	NA for 3p/2p
Off		Power off	
Flashing	High temperature.	Motor running	Auto calibration required. Feedback not reliable
			Temporary until temperature is OK then LED goes green
Flashing quickly		Calibrating	Input signal failure
		3p/2p: Feedback Calibrating only	NA for 3p/2p

The actuator leaves the generic fault mode by pressing the button at least 5 seconds and the error previously detected has been resolved

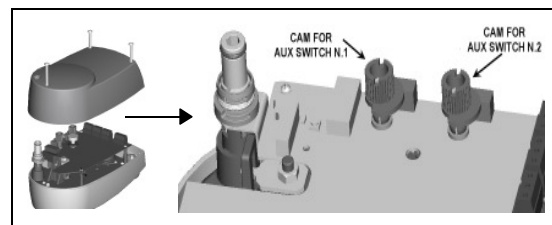
**Feedback output**

Input Signal	Feedback Output
0...10V DC or 0... 20 mA	0...10 V DC
2... 10V DC or 4... 20 mA	2... 10 V DC

Action depending on DIP switch-settings.

**Auxiliary Switches setting**

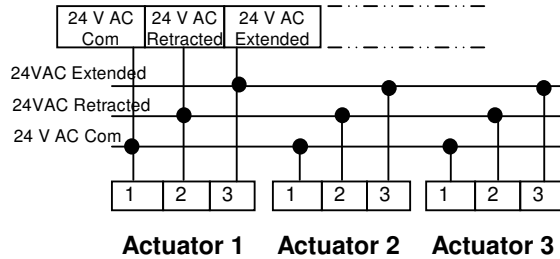
The auxiliary switches can be adjusted by means of the aux. switch cams (see below)



## Applications: Parallel and sequential operation

### Actuators without built-in positioner for controllers with PAT (Positioning Adjusting Time) output in parallel operation

All actuators have the same nominal running speed (rate of travel), see specifications.

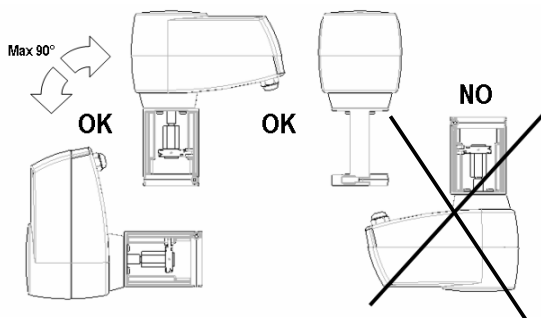


The number of actuators that can be linked to a single controller depends on the controller's active power in relation to the actuators power consumption.

## Mounting instructions

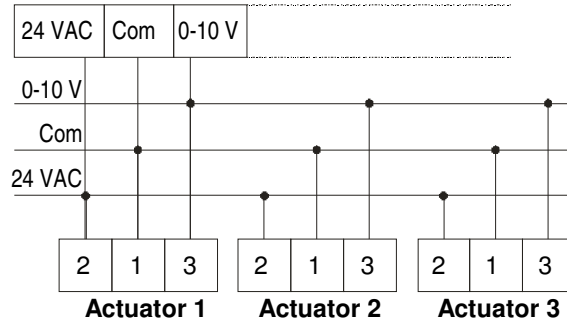
When mounting the actuator on a valve, please follow the instructions below:

- It is recommended that the valves be mounted upright or at angles not greater than 90° in an easily accessible location.



- Do not cover with insulating material.
- Sufficient clearance must be allowed for actuator wiring and commissioning (refer to the dimension drawings on page 10).
- The valve must be installed so that the plug seats against the flow, as indicated by the arrows on the valve.

### Actuators with built-in positioner for controllers with 0...10V output in parallel operation



The controller 0...10 V output can operate several actuators with built-in electronic positioner. The number of actuators that can be linked to a single controller depends on the controller's active power in relation to the actuators power consumption.

Each positioner has its own adjustment for the starting point. Each actuator can have a different input. Each positioner can be switched for direct or reverse action (see DIP switch on page 5)

## Wiring instructions

- All wiring must be in accordance with local regulations and national electrical codes and should be carried out by authorised personnel only.
- Make sure that the line power supply is in accordance with the power supply specified on the device.
- See also the instructions in paragraph "Application".

**⚠ WARNING**

**Shock Hazard**

- Disconnect the power supply before wiring connections are made to prevent personal injury.

**Equipment Damage Hazard**

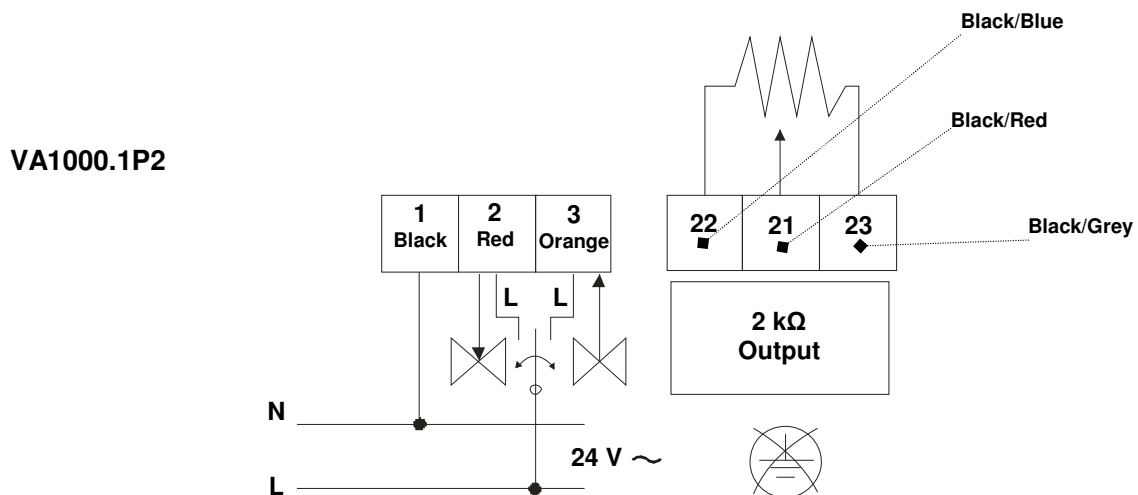
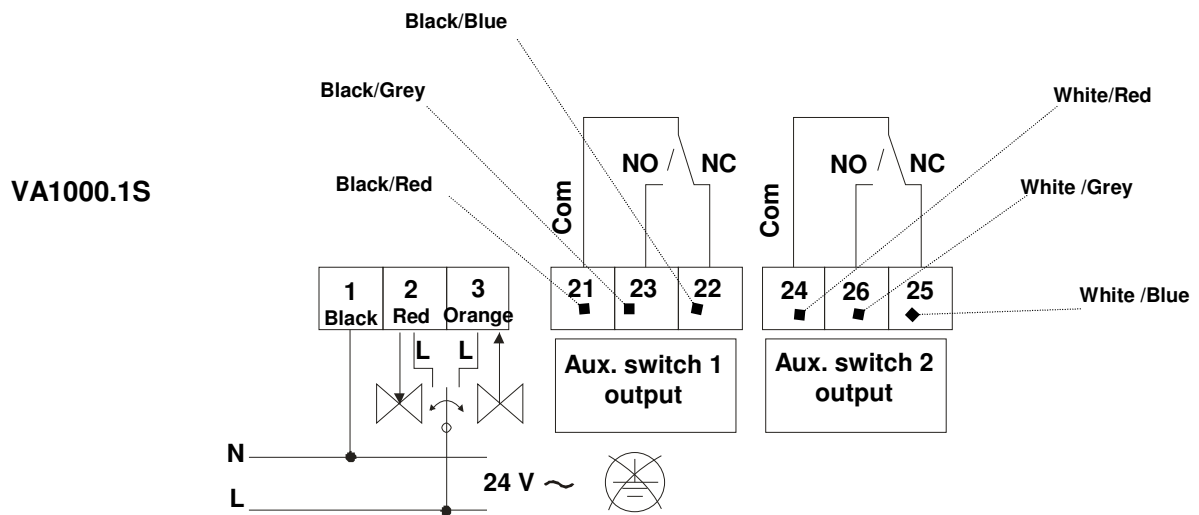
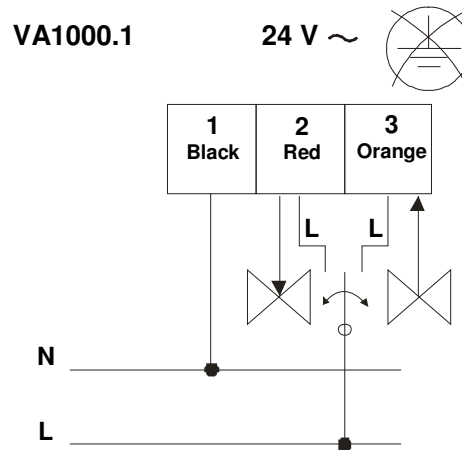
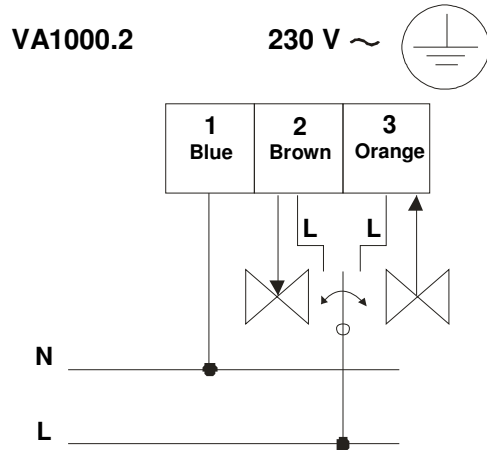
- Make and check all wiring connections before applying power to the system. Short circuited or improperly connected wires may result in permanent damage to the unit.

**Note:** These actuators are intended to control equipment under normal operating conditions. Where failure or malfunction of the actuator could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory systems) intended to warn of or protect against failure or malfunction of the actuator must be incorporated into and maintained as part of the control system.

# Wiring Diagrams

Actuators are delivered with a fitted 1.5 m long cable. The cable numbering corresponds to the actuator terminal numbering as seen in the wiring diagram.

## Floating Models



# Wiring Diagrams

Actuators are delivered with a fitted 1.5 m long cable. The cable numbering corresponds to the actuator terminal numbering as seen in the wiring diagram

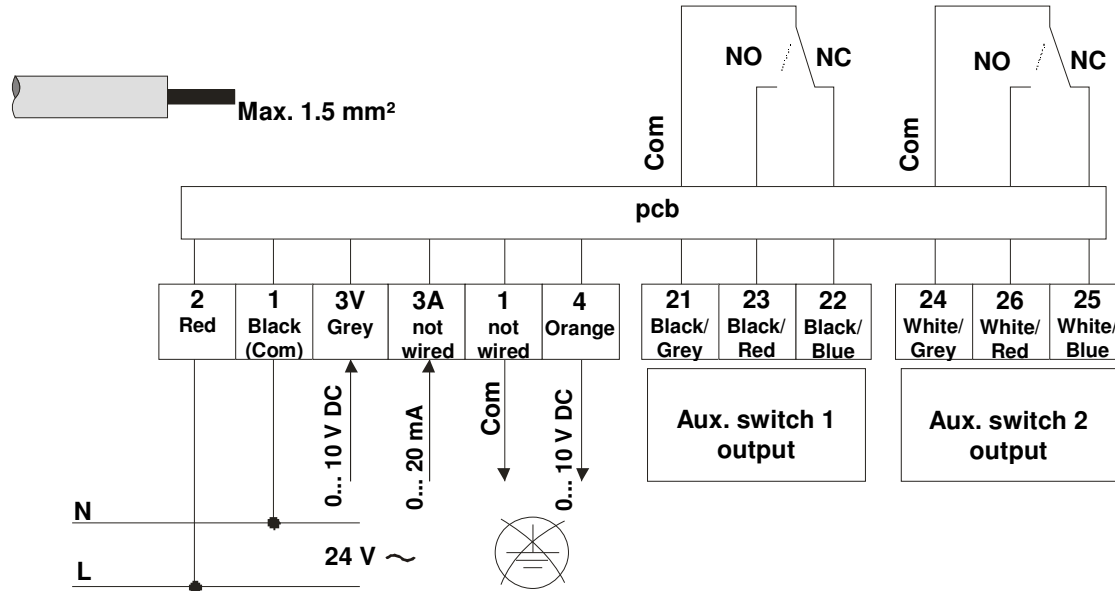
## Proportional Models

### VA1000.1MS

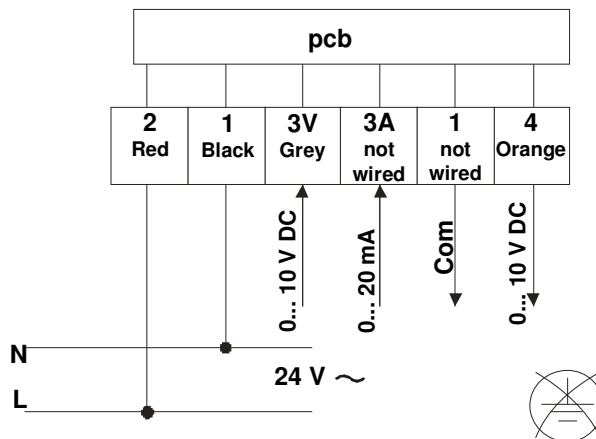


#### WARNING

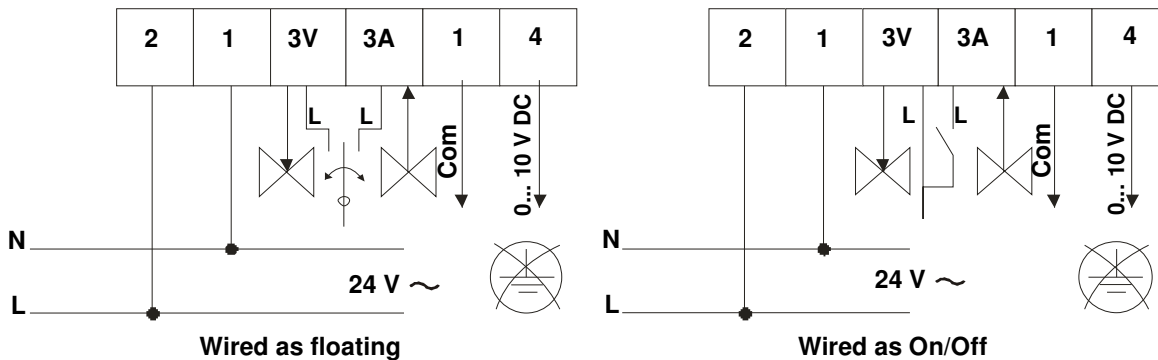
For 0(4)...20 mA control the grey wire must be moved from the 3V terminal to the 3A terminal!



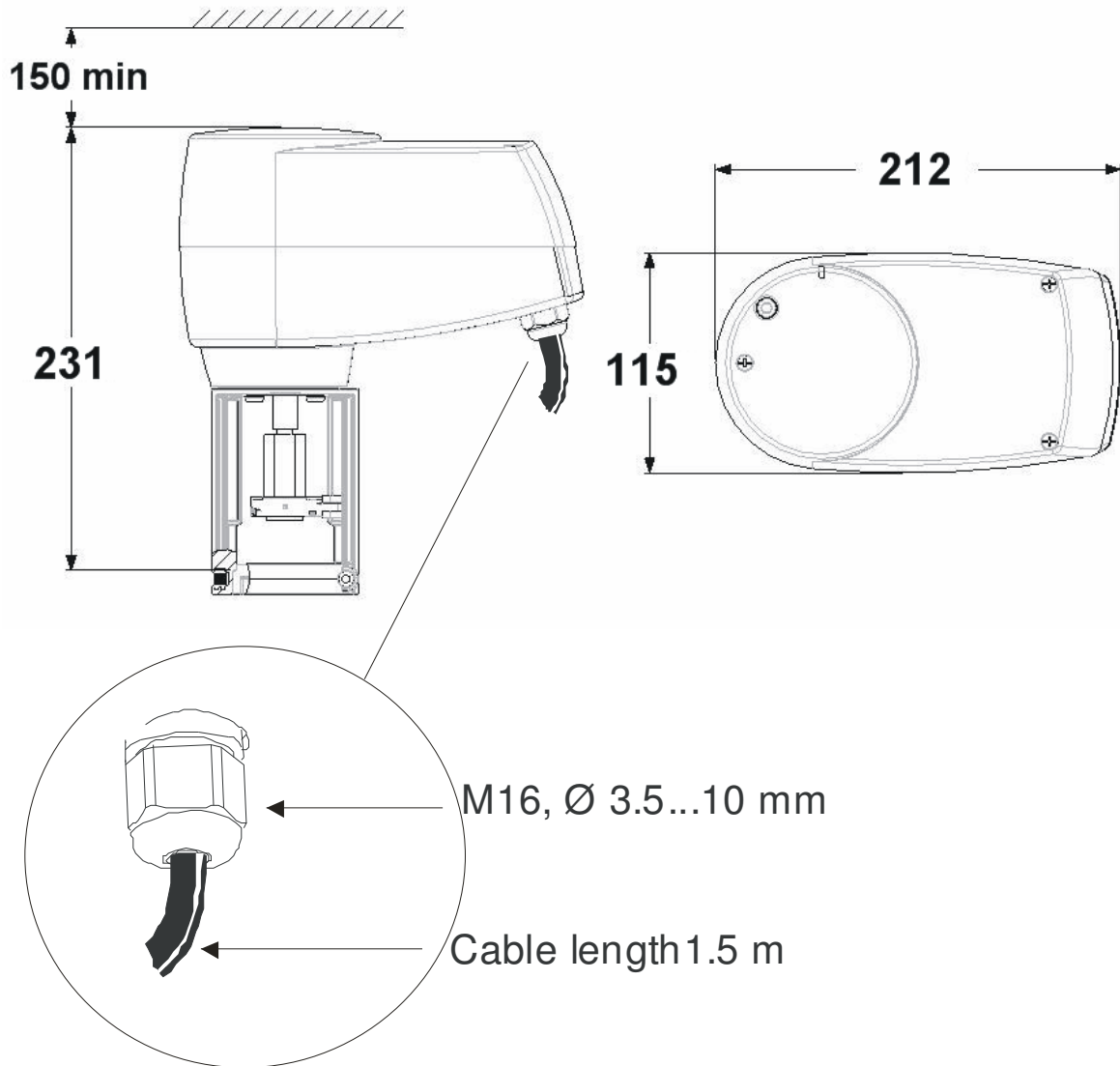
### VA1000.1M



Re-wiring for floating or On/Off function must be carried out on-site by the user.





**D**imensions (in mm)

## Specifications

Product		VA1000.	
Models	Floating		Proportional
<b>Supply voltage</b>	230 V $\pm$ 15 % 50/60 Hz	24 V (19...30 V) 50/60 Hz	24 V (19...30 V) 50/60 Hz
<b>Control signal</b>	Positioner adjustment time (PAT)		0...10 V DC or 0... 20 mA
	-		2...10 V DC or 4...20 mA
<b>Power consumption</b>	3 W (6s/mm)	2.5 W (6s/mm)	4.5 W (3s/mm) 3.5 W (6s/mm)
<b>VA rating</b>	8 VA	3 VA	6 VA
<b>Impedance</b>	-		100k $\Omega$ min. @ 0(2)...10V, 120 $\Omega$ @ 0(4)...20mA
<b>Feedback signal</b>	2 mA max. @ 0(2) VDC – 10 VDC, 5 k $\Omega$ min. load		
<b>Manual override</b>	Standard		
<b>Thrust</b>	1000N $\pm$ 20%		
<b>Stroke</b>	7 mm – 25 mm		
<b>Nominal stroke timing :</b>	6s/mm $\pm$ 10%	6s/mm $\pm$ 10%, 3s/mm $\pm$ 10% selectable	
<b>Enclosure protection</b>	IP54		
<b>Protection class</b>	230 V with cable = I ; 24 V = III		
<b>Noise pollution</b>	35 dB(A) @ 6s/mm; 45 dB(A) @ 3s/mm		
<b>Materials:</b>			
<b>Gearbox &amp; yoke</b>	Die cast aluminium		
<b>Cover</b>	Resin ABS/PC – UL94-V0		
<b>Stem</b>	Stainless steel		
<b>Coupler</b>	Brass		
<b>Ambient Operating Condition</b>	-5 $^{\circ}$ C – 55 $^{\circ}$ C, 10% – 90% RH non-condensing		
<b>Ambient Storage Condition</b>	-40 $^{\circ}$ C – 80 $^{\circ}$ C, 5% – 95% RH non-condensing		
<b>Wiring</b>	1.5m cable length (0.75 mm <sup>2</sup> ) halogen free components attached per 1.5 mm <sup>2</sup> terminal		
<b>Wiring entrance</b>	M16 cable conduit adapters		
<b>Net weight</b>	1.7 kg		
<b>Life time</b>	Tested for 250,000 full cycles		
<b>CE Compliance</b>	EMC directive 89/336 EEC: EN 61000-6-2, EN 61000-6-3 Low voltage directive 73/23 EEC: EN 60730-1		

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Joventa office. Joventa shall not be liable for damages resulting from misapplication or misuse of its products.