M9116
2-Point & 3-Point Electric Damper-Actuator (110 VAC)

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

Due to their very small size, and the universal adapter with angle of rotation limiting, these actuators are highly versatile.

Key Features

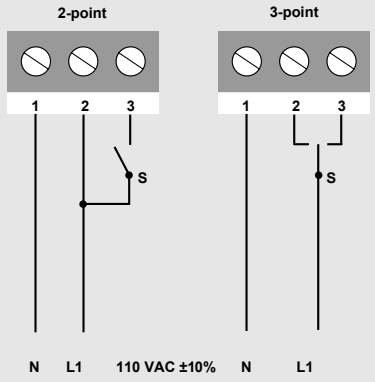
- 2 and 3-point control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10...20 mm Ø
  Square shafts from 10...16 mm
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops
- Shaft min. length 48 mm

Type/Specifications/Technical data

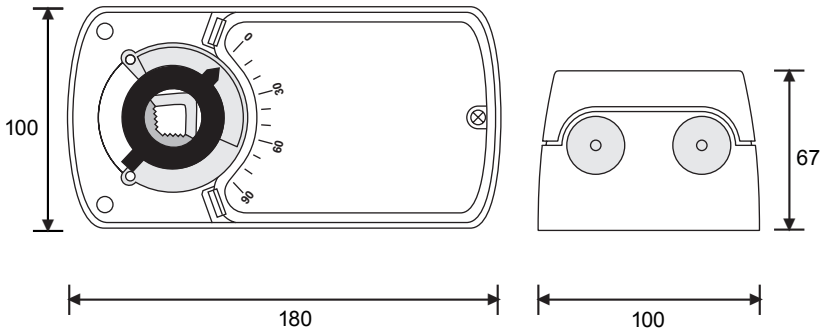
M91..-AAA-1	Damper actuator 110 VAC
M91..-AAC-1	Damper actuator 110 VAC with 2 adjustable auxiliary switches

Actuators	**Units**	**M9116-AA.-1**
Drive torque	Nm	16
Damper area approx.	m^2	3
Running time	sec	80...110
Power supply	V	110 VAC
Frequency	Hz	50
Power consumption:		
- operating	W	5.5
- at end stops	W	1.0
For wire gauge	VA / I max.	6.5 / 0.1 @ 2 msec
Weight	Kg	1.1
Control signal		2 and 3-point
Position signal		Potentiometer
Angle-of-rotation:	- working range	90° (93° mech.)
	- limiting	5°...85° in 5° steps
Auxiliary switch rating		3 (1.5) Amp 230 V
Service life approx.		60'000 cycles
Noise level		45 dB (A)
Protection class		II
Enclosure		IP 40
Ambient temperature range		–20...50°C
Ambient humidity		5...95% rH non-condensing
Maintenance		Maintenance-free
Standards		The actuators meet CE requirements

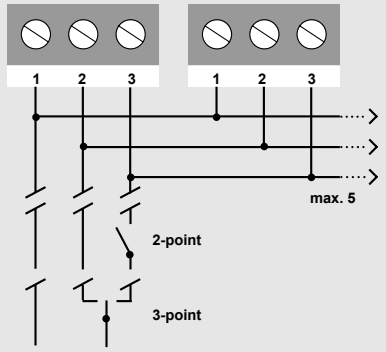
Wiring diagram



Dimensions (mm)

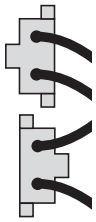


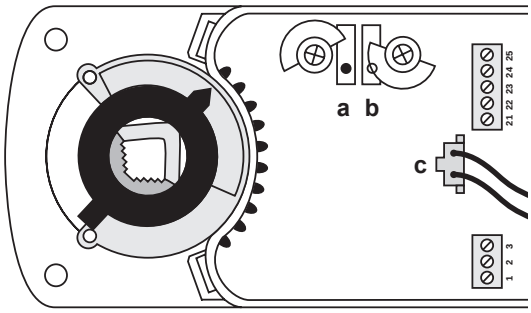
Parallel connection



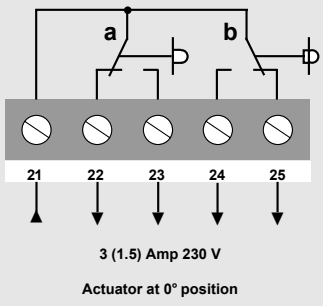
Changing direction of rotation

The direction of rotation can be changed by reversing plug **c**





Auxiliary switches (S)

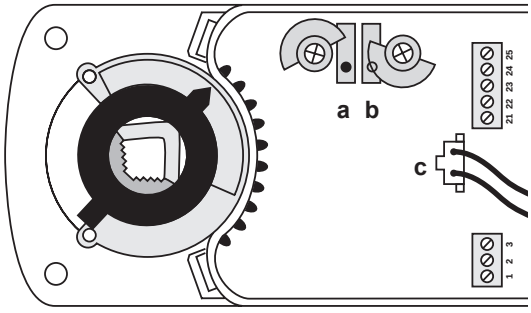


Auxiliary switch adjustment

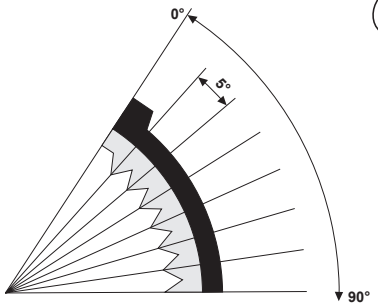
Factory setting:

Switch **a** at 10°
Switch **b** at 80°

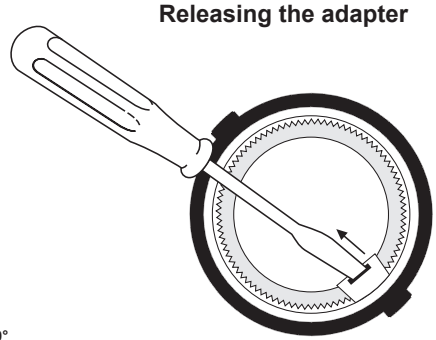
The operating points can be altered as required by simply rotating by hand.



Angle-of-rotation limiting



Releasing the adapter



For details of installation and commissioning see Service and Data Information (SDI)

JOHNSON CONTROLS

Johnson Controls International, Inc.
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European Factories: Essen (Germany), Leeuwarden (The Netherlands) and Lomagna (Italy)
Branch Offices Principal European Cities.

Printed in Germany

M9108, M9116, M9124
2-Point & 3-Point Electric Damper-Actuator

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

The universal stem adapter with rotation limiting combined with it's compact design make this actuator highly versatile.

Key Features

- 2 and 3-point control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10...20 mm Ø
  Square shafts from 10...16 mm
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops
- Shaft min. length 48 mm

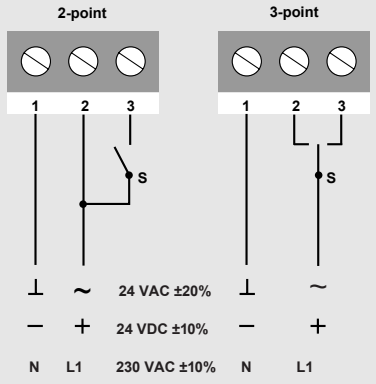
Type/Specifications/Technical data

M91..-AGA-1	Damper actuator 24 VAC/VDC
M91..-AGC-1	Damper actuator 24 VAC/VDC with 2 adjustable auxiliary switches
M91..-AGE-1	Damper actuator 24 VAC/VDC with feedback potentiometer 1K Ω
M91..-AGD-1	Damper actuator 24 VAC/VDC with feedback potentiometer 140 Ω
M91..-AGF-1	Damper actuator 24 VAC/VDC with feedback potentiometer 2K Ω

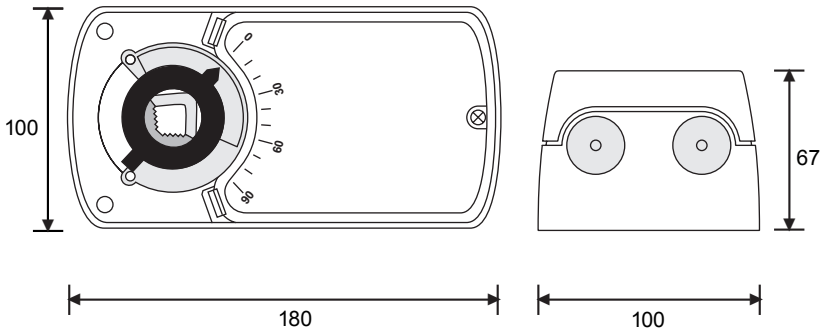
M91..-ADA-1	Damper actuator 230 VAC
M91..-ADC-1	Damper actuator 230 VAC with 2 adjustable auxiliary switches
M91..-ADE-1	Damper actuator 230 VAC with feedback potentiometer 1K Ω
M91..-ADD-1	Damper actuator 230 VAC with feedback potentiometer 140 Ω
M91..-ADF-1	Damper actuator 230 VAC with feedback potentiometer 2K Ω

Actuators	Units	M9108-AG.-1	M9116-AG.-1	M9124-AG.-1	M9108-AD.-1	M9116-AD.-1	M9124-AD.-1
Drive torque	Nm	8	16	24	8	16	24
Damper area approx.	m²	1.5	3	4.5	1.5	3	4.5
Running time	sec	30…45	80…110	125…160	30…45	80…110	125…160
Power supply	V		24 VAC/VDC			230 VAC	
Frequency	Hz		50-60			50-60	
Power consumption							
- operating	W		4.0			5.5	
- at end stops	W		0.5			1.0	
For wire gauge	VA / I max		6.5 / 2 A @ 2msec			6.0 / 0.1 A @ 2msec	
Weight	Kg		1.1			1.2	
Control signals				2 and 3-point			
Position signal				Potentiometer			
Angle of rotation: - working range				90° (93° mech.)			
- limiting				5°...85° in 5° steps			
Auxiliary switch rating				3 (1.5) Amp 230 V			
Service life				60'000 rotations			
Noise level				45 dB (A)			
Protection class				II			
Enclosure				IP 40			
Ambient temperature range				–20...50°C			
Ambient humidity				5...95% rH non-condensing			
Maintenance				maintenance-free			
Standard				The actuators meet CE requirements			

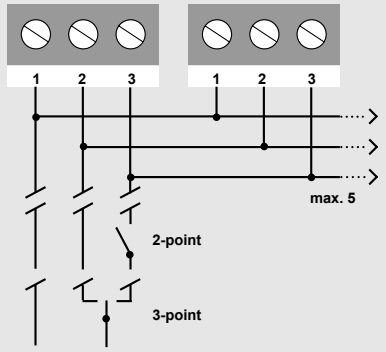
Wiring diagram



Dimensions (mm)

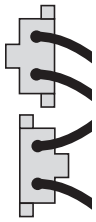


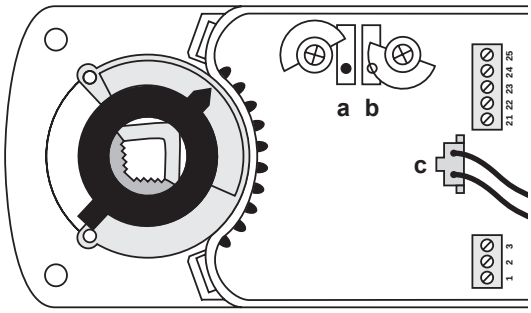
Parallel connection



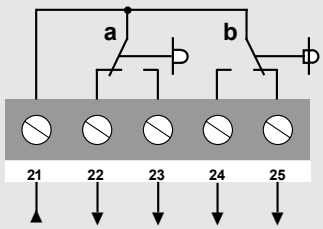
Changing direction of rotation

The direction of rotation can be changed by reversing plug **c**





Auxiliary switches (S)



3 (1.5) Amp 230 V

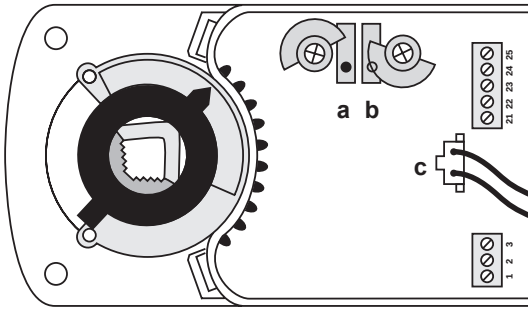
Actuator at 0° position

Auxiliary switch adjustment

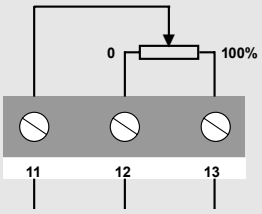
Factory setting:

Switch **a** at 10°
Switch **b** at 80°

The operating points can be altered as required by simply rotating by hand.

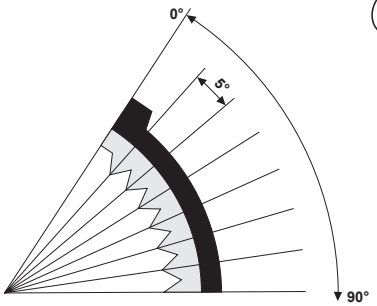


Potentiometer (P)

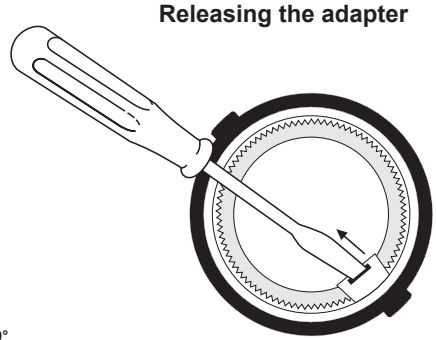


P = 0.5 W/±10%

Angle-of-rotation limiting



Releasing the adapter



For details of installation and commissioning see Service and Data Information (SDI)

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Printed in Germany

M9108, M9116 & M9124
Proportional Electric Damper-Actuator (230V)

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

The universal stem adapter with rotation limiting combined with it's compact design make this actuator highly versatile.

Key Features

- 0(2)…10 VDC control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10…20 mm Ø
  Square shafts 10…16 mm
- Low noise level
- Choice of rotation
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops

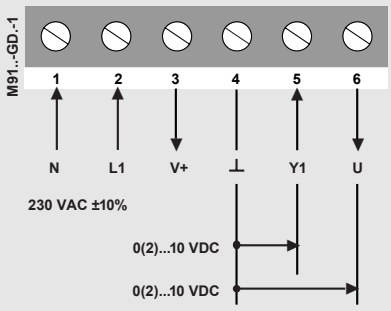
Type/Specifications/Technical data

M91..-GDA-1	Damper actuator 230 VAC
M91..-GDC-1	Damper actuator 230 VAC with 2 adjustable auxiliary switches

Actuators	Units	M9108-GD.-1	M9116-GD.-1	M9124-GD.-1
Drive torque	Nm	8	16	24
Damper area approx.	m^2	1.5	3.0	4.5
Running time	s	30…45	80…110	125…160
Power supply	V		230 VAC	
Frequency	Hz		50-60	
Power consumption:				
- operating	W		5.5	
- at end stops			0.6	
For wire gauge	VA / I max.		6.0 / 0.1 A @ 2 msec	
Weight	Kg		1.2	
Control signal	Y1		0(2)…10 VDC	
Control signal	Y2		none	
Position signal	U		0(2)…10 VDC	
Angle-of-rotation	- working range		90° (93° mech.)	
	- limiting		5°…85° in 5° steps	
Auxiliary switch rating			3 (1.5) Amp 24 V	
Noise level			45 dB (A)	
Protection class			II	
Enclosure			IP 40	
Ambient temperature range			–20...50°C	
Ambient humidity			5…95% rH non-condensing	
Maintenance			maintenance-free	
Standards			The actuators meet CE requirements	

Subject to design modifications without notice

Wiring diagram



Adjusting the control signals

Microswitch **d**

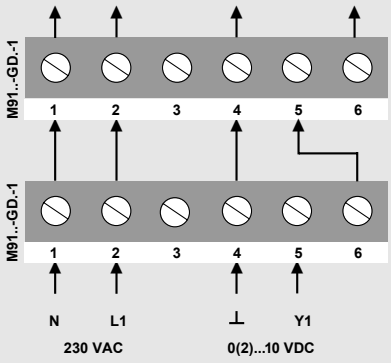
Control signal Y1	0(2)...10 VDC
Input resistance	Ri 100 kΩ
Input resistance	
Position signal U	0(2)...10 VDC
Load resistance	> 50 kΩ

The control signal can be changed to 2...10 VDC by moving microswitch 1 to the ON position.

0...10 VDC

2...10 VDC

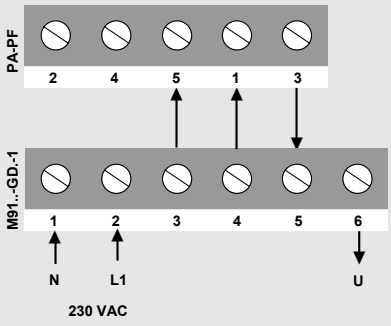
Parallel connection



When M91..-GD.-1 actuators are to be operated in parallel, the output signal U = 0(2)...10 VDC (Terminal 6) of the master actuator must be connected to Terminal 5 of the next slave actuator, etc.

Note:
Up to 5 actuators can be operated in parallel.

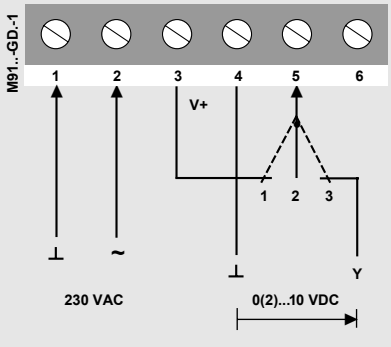
Remote positioner



M91..-GD.-1 actuators can also be controlled by means of a Johnson Controls M9000-PA/PF remote positioner with 0(2)...10 VDC control signal.

Note:
Up to 5 actuators can be operated in parallel.

Override control

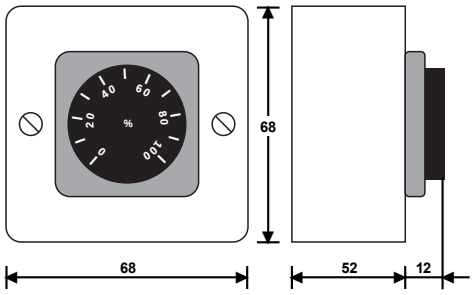


Override control of M91..-GD.-1 actuators can be provided with the circuitry shown opposite.

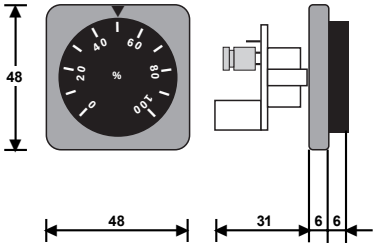
Switch position:
1 = Actuator runs at 10 V
2 = Actuator runs at 0(2) V
3 = Automatic control

Dimensions (mm)

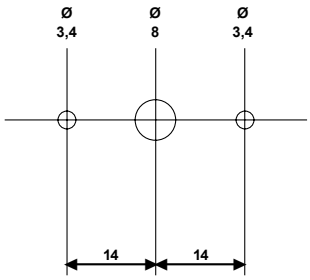
M9000-PA in surface-mounted housing



M9000-PF for flush mounting



Drilling template

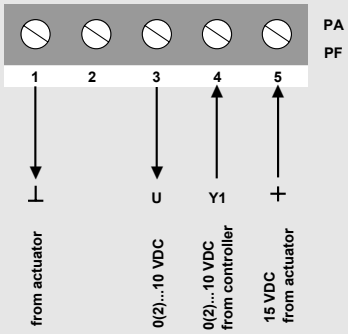


Designations/Specifications/Technical data

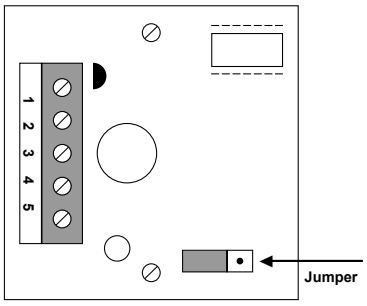
M9000-PA 0...100% Remote positioner for surface mounting
M9000-PF 0...100% Remote positioner for flush mounting

For actuators	Type	M91..-GD.-1
Power supply	V	15 VDC+ from M91..-GD.-1
Frequency	Hz	—
Output signal U	U	0(2)...10 VDC
Output rating		for up to 5 actuators
Control signal Y1	V	0(2)...10 VDC

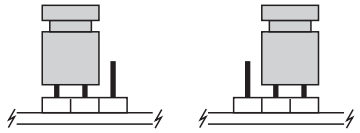
Wiring diagram



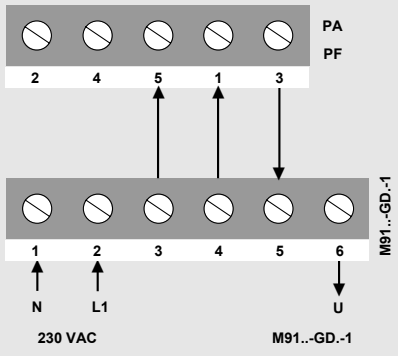
Output signal matching



The output signal 0...10 VDC or 2...10 VDC is proportional to 0...100% rotation of the adjuster knob.

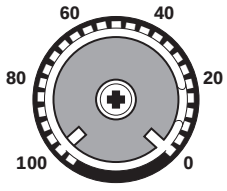


for manual control

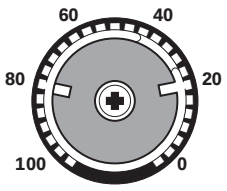


Angle-of-rotation limiting

0...100%



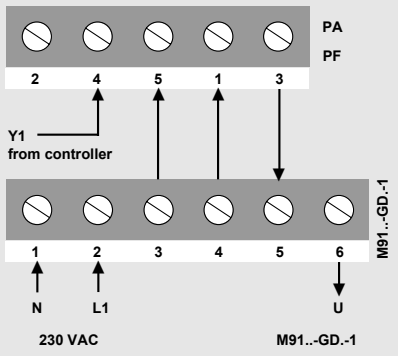
20...80%



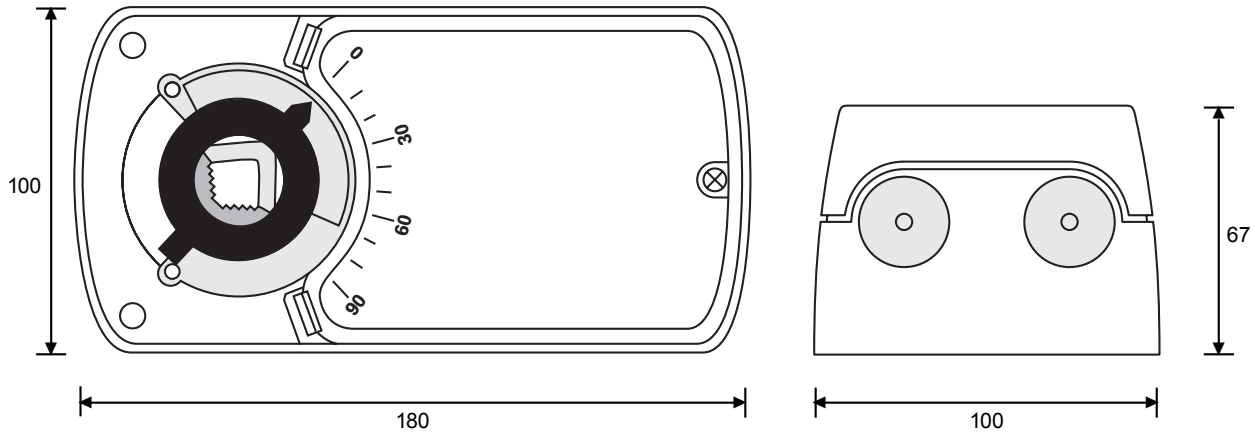
The adjuster knob can be removed by pulling it out of the front plate.
Inside the knob the mechanical limiting of the angle-of-rotation can be adjusted by moving the stop springs.

Factory setting 0...100%.

for minimum limiting



Dimensions (mm)



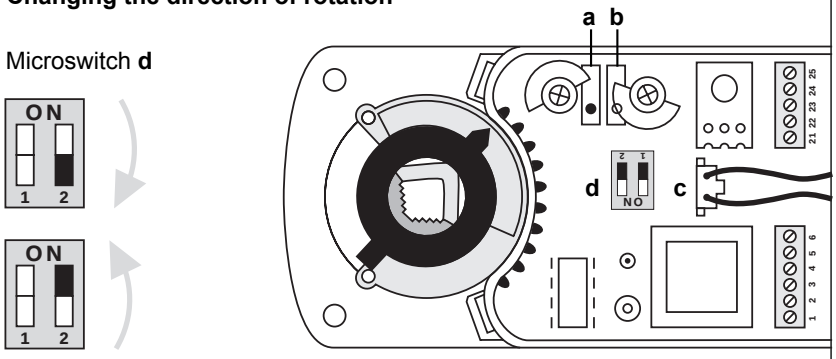
Direction of rotation

In order to reverse the direction of rotation, move microswitch 2 to the ON position - the action of the output signal will also be changed in the process.

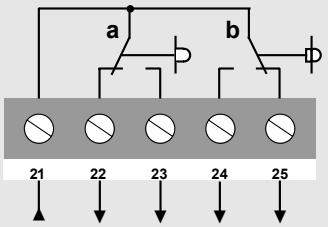
Plug (c) must never be reversed otherwise the motor will not function correctly.

Changing the direction of rotation

Microswitch **d**



Auxiliary switches (S)



3 (1.5) Amp 24 V

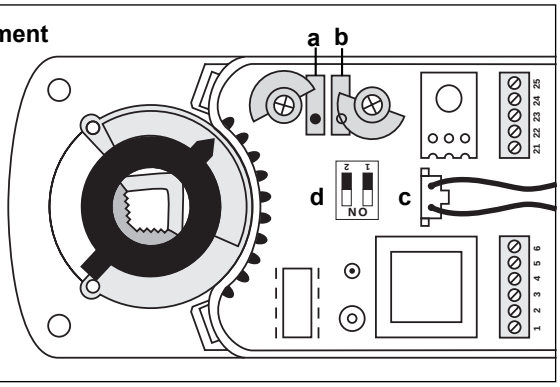
Actuator at 0° position

Auxiliary switch adjustment

Factory setting:

Switch **a** at 10°
Switch **b** at 80°

The operating points can be altered as required by simply turning by hand.

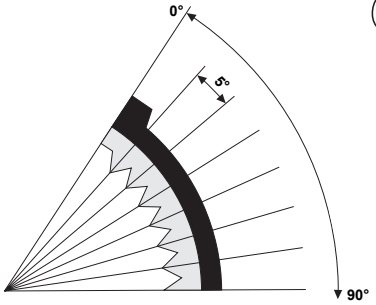


Angle-of-rotation

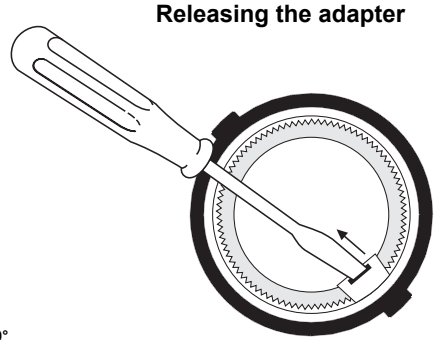
The angle-of-rotation/working range can be adjusted mechanically by repositioning the adapter in 5°steps.

The adapter can be released by simply pressing the clip at the base of the actuator.

Angle-of-rotation limiting



Releasing the adapter



For details of installation and commissioning see Service and Data Information (SDI)

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Branch Offices Principal European Cities.
Printed in Germany

M9108, M9116 & M9124
Proportional Damper-Actuators (110 VAC)

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

Due to the universal adapter with angle of rotation limiting this actuator is highly versatile.

Key Features

- 0(2)…10 VDC control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10…20 mm Ø
  Square shafts from 10…16 mm
- Low noise level
- Choice of rotation
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops

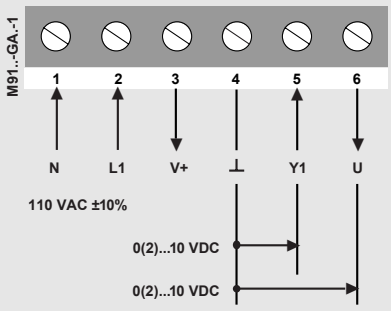
Type/Specifications/Technical data

M91..-GAA-1	Damper actuator 110 VAC
M91..-GAC-1	Damper actuator 110 VAC with 2 adjustable auxiliary switches

Actuators	Units	M9108-GA.-1	M9116-GA.-1	M9124-GA.-1
Drive torque	Nm	8	16	24
Damper area approx.	m^2	1.5	3.0	4.5
Running time	s	30…45	80…110	125…160
Power supply	V		110 VAC	
Frequency	Hz		50-60	
Power consumption:				
- operating	W		5.5	
- at end stops			0.6	
For wire gauge	VA / I max.		6.0 / 0.1 A @ 2 msec	
Weight	Kg		1.2	
Control signal	Y1		0(2)…10 VDC control	
Position signal	U		0(2)…10 VDC	
Angle-of-rotation	- working range		90° (93° mech.)	
	- limiting		5°…85° in 5° steps	
Auxiliary switch rating			3 (1.5) Amp 24 V	
Noise level			45 dB (A)	
Protection class			II	
Enclosure			IP 40	
Ambient temperature range			–20...50°C	
Ambient humidity			5…95% rH non-condensing	
Maintenance			maintenance-free	
Standards			The actuators meet CE requirements	

Subject to design modifications without notice

Wiring diagram



Adjusting the control signals

Control signal Y1	0(2)...10 VDC
Input resistance	Ri 100 kΩ
Input resistance	
Position signal U	0(2)...10 VDC
Load resistance	> 50 kΩ

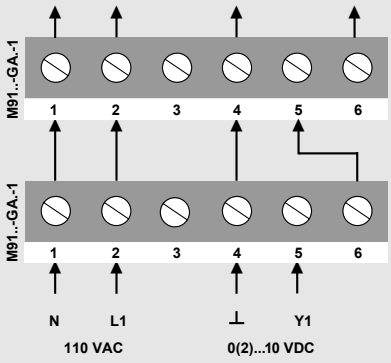
The control signal can be changed to 2...10 VDC by moving microswitch 1 to the ON position.

Microswitch **d**

0...10 VDC

2...10 VDC

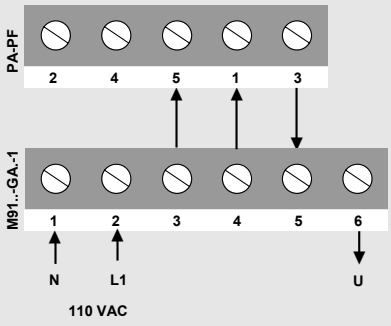
Parallel connection



When M91..-GA.-1 actuators are to be operated in parallel, the output signal U = 0(2)...10 VDC (Terminal 6) of the master actuator must be connected to Terminal 5 of the next slave actuator, etc.

Note:
Up to 5 actuators can be operated in parallel.

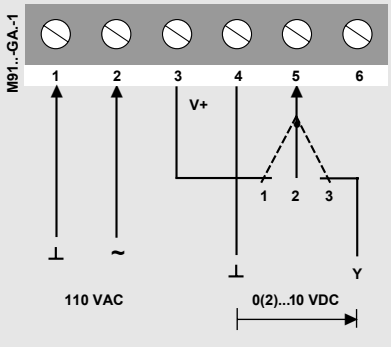
Remote positioner



M91..-GA.-1 actuators can also be controlled by means of a Johnson Controls M9000-PA/PF remote positioner with 0(2)...10 VDC control signal.

Note:
Up to 5 actuators can be operated in parallel.

Override control

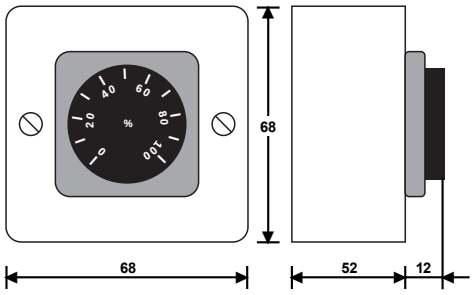


Override control of M91..-GA.-1 actuators can be provided with the circuitry shown opposite.

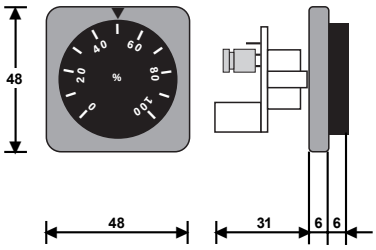
Switch position:
1 = Actuator runs at 10 V
2 = Actuator runs at 0(2) V
3 = Automatic control

Dimensions (mm)

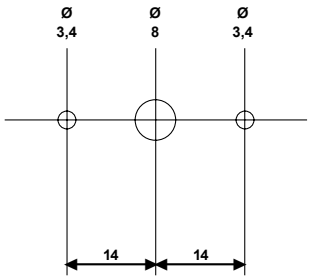
M9000-PA in surface-mounted housing



M9000-PF for flush mounting



Drilling template

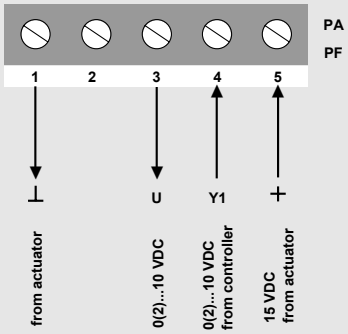


Designations/Specifications/Technical data

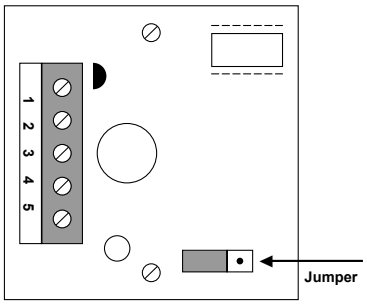
M9000-PA 0...100% Remote positioner for surface mounting
M9000-PF 0...100% Remote positioner for flush mounting

For actuators	Type	M91..-GA.-1
Power supply	V	15 VDC+ from M91..-GA.-1
Frequency	Hz	—
Output signal U	U	0(2)...10 VDC
Output rating		for up to 5 actuators
Control signal Y1	V	0(2)...10 VDC

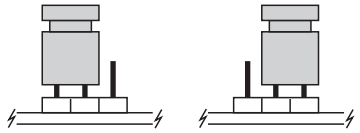
Wiring diagram



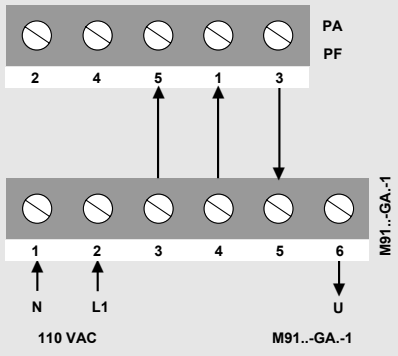
Output signal matching



The output signal 0...10 VDC or 2...10 VDC is proportional to 0...100% rotation of the adjuster knob.

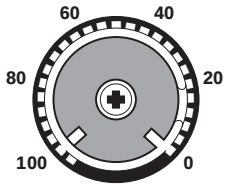


for manual control

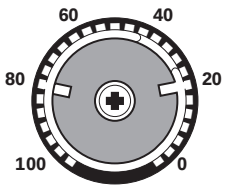


Angle-of-rotation limiting

0...100%



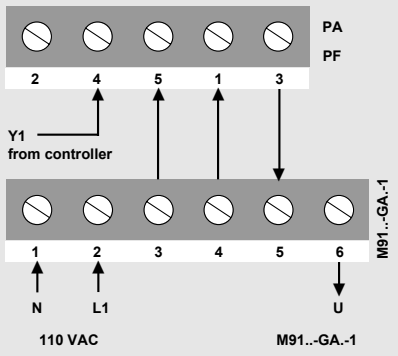
20...80%



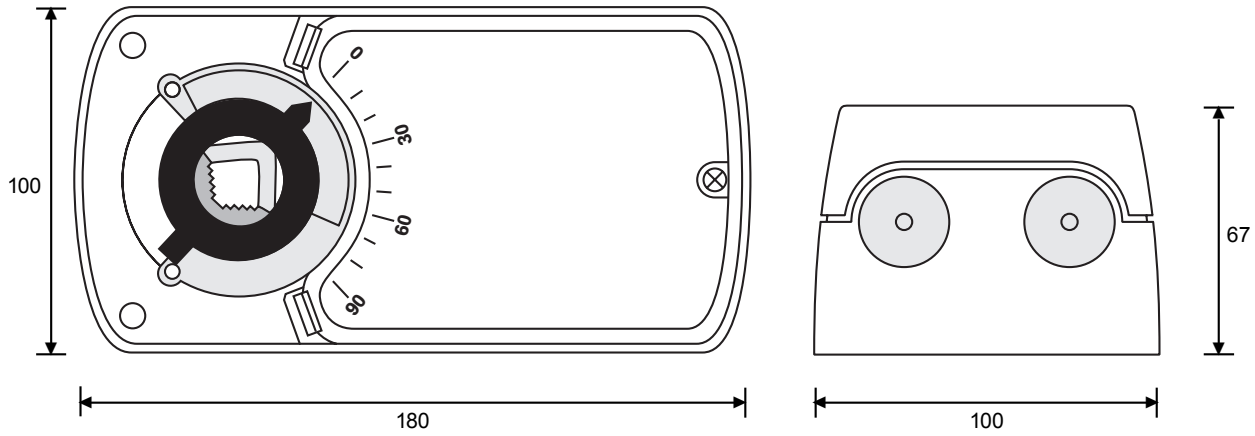
The adjuster knob can be removed by pulling it out of the front plate.
Inside the knob the mechanical limiting of the angle-of-rotation can be adjusted by moving the stop springs.

Factory setting 0...100%.

for minimum limiting



Dimensions (mm)



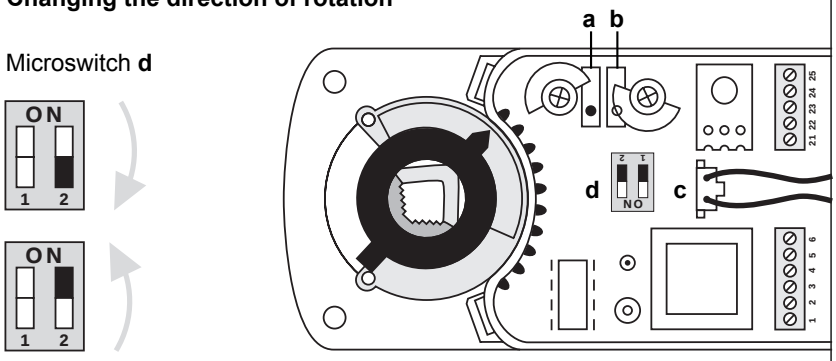
Direction of rotation

In order to reverse the direction of rotation, move microswitch 2 to the ON position - the action of the output signal will also be changed in the process.

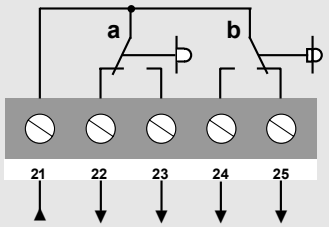
Plug (c) must never be reversed otherwise the motor will not function correctly.

Changing the direction of rotation

Microswitch **d**



Auxiliary switches (S)



3 (1.5) Amp 24 V

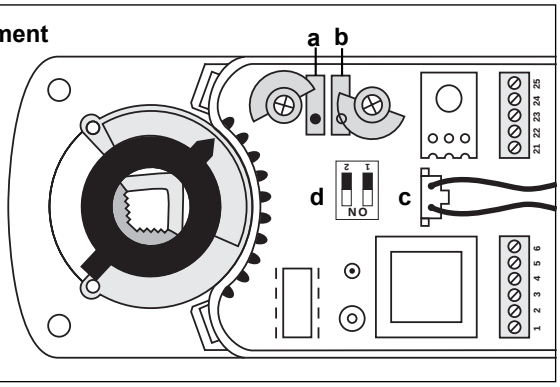
Actuator at 0° position

Auxiliary switch adjustment

Factory setting:

Switch **a** at 10°
Switch **b** at 80°

The operating points can be altered as required by simply turning by hand.

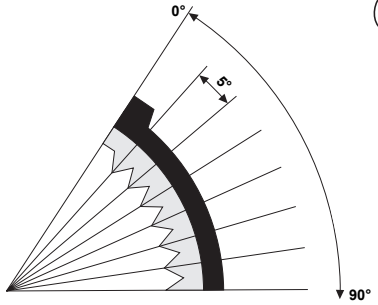


Angle-of-rotation

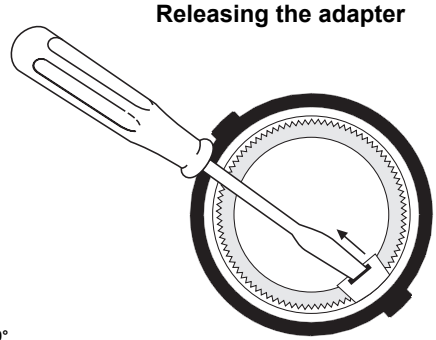
The angle-of-rotation/working range can be adjusted mechanically by repositioning the adapter in 5°steps.

The adapter can be released by simply pressing the clip at the base of the actuator.

Angle-of-rotation limiting



Releasing the adapter



For details of installation and commissioning see Service and Data Information (SDI)

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M9108, M9116 & M9124
Current Controlled Damper-Actuators (110 VAC)

Application

These Johnson Controls electric actuators have been specially designed for use with medium and large air dampers.

Thanks to their very small size and clever construction they are ideal for applications where space is limited.

A key feature of the design is the Johnson Controls stem adapter which also incorporates angle-of-rotation limiting and position indication.

Key Features

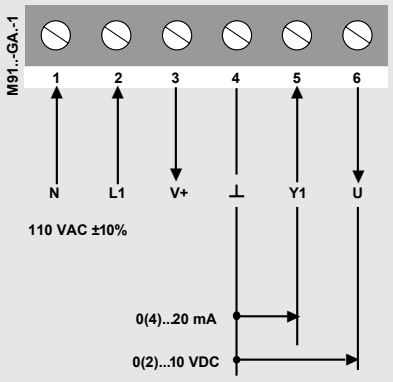
- 0(4)...20 mA control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10...20 mm Ø
  Square shafts from 10...16 mm
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops
- Shaft min. length 48 mm

Type/Specifications/Technical data

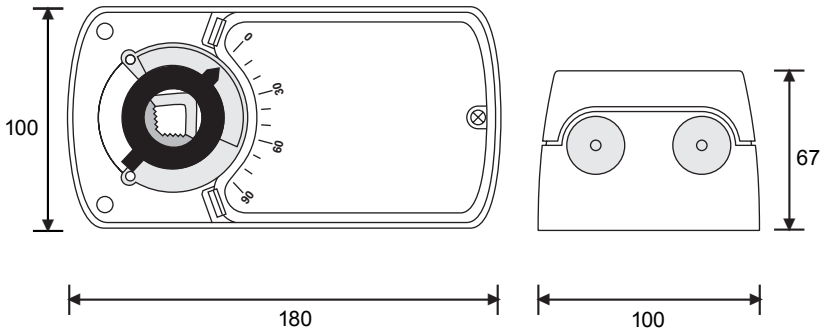
M91..-GAA-1.01	Damper actuator 110 VAC
M91..-GAC-1.01	Damper actuator 110 VAC with 2 adjustable auxiliary switches

Actuators	Units	M9108-GA.-1.01	M9116-GA.-1.01	M9124-GA.-1.01
Drive torque	Nm	8	16	24
Damper area approx.	m^2	1.5	3.0	4.5
Running time	s	30…45	80…110	125…160
Power supply	V		110 VAC	
Frequency	Hz		50-60	
Power consumption:				
- operating	W		5.5	
- at end stops			0.6	
For wire gauge	VA / I max.		6.0 / 0.1 A @ 2 msec	
Weight	Kg		1.2	
Control signal	Y1		0(4)…20 mA / Ri > 100 k Ω	
Position signal	U		0(2)…10 VDC Ri > 50 k Ω	
Angle-of-rotation	- working range		90° (93° mech.)	
	- limiting		5°…85° in 5° steps	
Auxiliary switch rating			3 (1.5) Amp 24 V	
Noise level			45 dB (A)	
Protection class			II	
Enclosure			IP 40	
Ambient temperature range			–20...50°C	
Ambient humidity			5…95% rH non-condensing	
Maintenance			maintenance-free	
Standards			The actuators meet CE requirements	

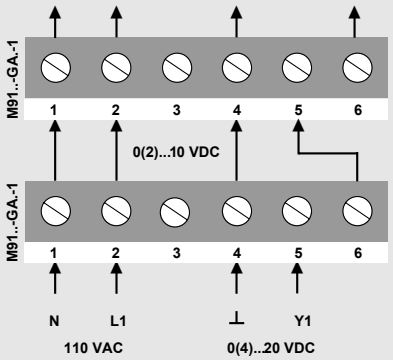
Wiring diagram



Dimensions (mm)



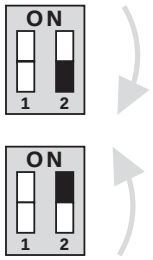
Parallel connection



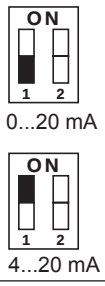
Changing the direction of rotation

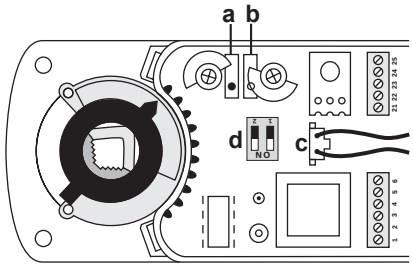
Microswitch **d**

Direction of rotation

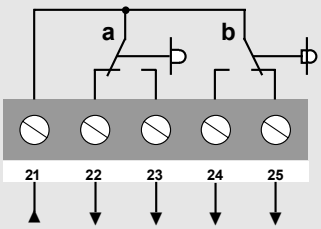


Control signal





Auxiliary switches (S)



3 (1.5) Amp 24 V

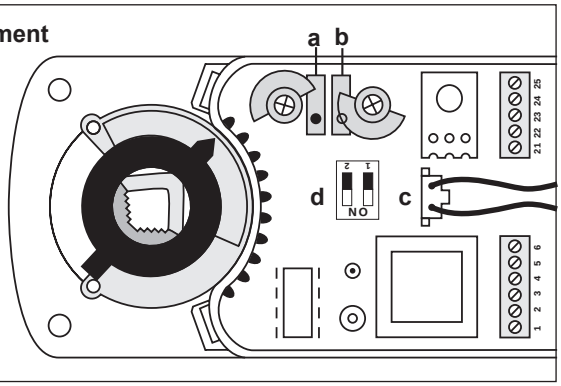
Actuator at 0° position

Auxiliary switch adjustment

Factory setting:

Switch **a** at 10°
Switch **b** at 80°

The switch contact points can be changed manually to any required position by turning the switch.

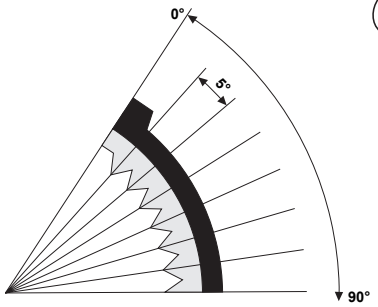


Angle-of-rotation

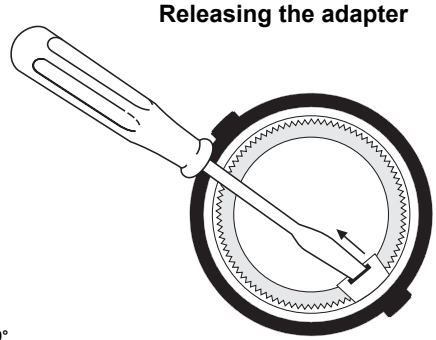
The rotation angle operating range can be set in 5° steps by moving the adapter.

The adapter can be removed simply by pressing the adapter clip on the underside of the actuator.

Angle-of-rotation limiting



Releasing the adapter



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Printed in Germany

M9108, M9116 & M9124
Current Control Electric Damper-Actuators (230 VAC)

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

Due to their very small size, and the universal adapter with angle of rotation limiting, these actuators are highly versatile.

Key Features

- 0(4)...20 mA control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10...20 mm Ø
  Square shafts from 10...16 mm
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops
- Shaft min. length 48 mm

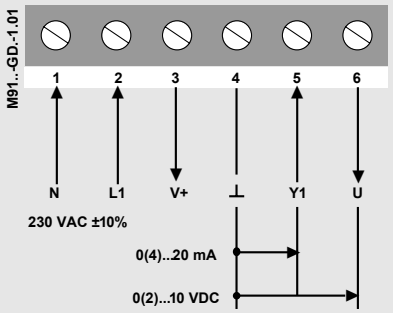
Type/Specifications/Technical data

M91..-GDA-1.01	Damper actuator 230 VAC
M91..-GDC-1.01	Damper actuator 230 VAC with 2 adjustable auxiliary switches

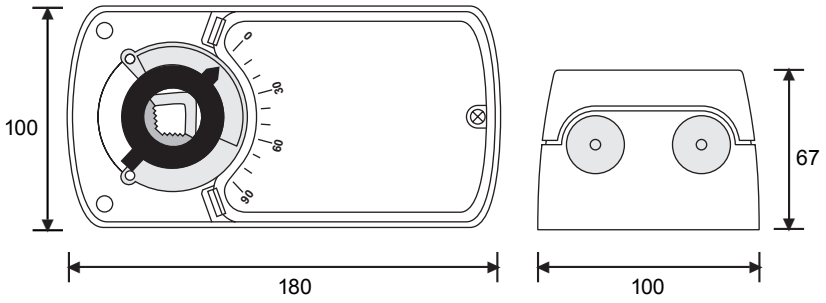
Actuators	Units	M9108-GD.-1.01	M9116-GD.-1.01	M9124-GD.-1.01
Drive torque	Nm	8	16	24
Damper area approx.	m^2	1.5	3.0	4.5
Running time	s	30…45	80…110	125…160
Power supply	V		230 VAC	
Frequency	Hz		50-60	
Power consumption:				
- operating	W		5.5	
- at end stops			0.6	
For wire gauge	VA / I max.		6.0 / 0.1 A @ 2 msec	
Weight	Kg		1.2	
Control signal	Y1		0(4)…20 mA / Ri > 100 k ohm	
Position signal	U		0(2)…10 VDC / Ri > 50 k ohm	
Angle-of-rotation	- working range		90° (93° mech.)	
	- limiting		5°…85° in 5° steps	
Auxiliary switch rating			3 (1.5) Amp 24 V	
Noise level			45 dB (A)	
Protection class			II	
Enclosure			IP 40	
Ambient operating temperature			–20...50°C	
Ambient storage temperature			–30...70°C	
Ambient humidity			5…95% rH non-condensing	
Maintenance			maintenance-free	
Standards			The actuators meet CE requirements	

Subject to design modifications without notice

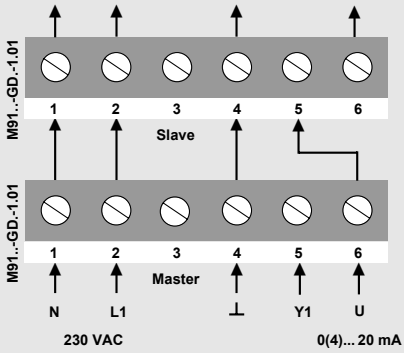
Wiring diagram



Dimensions (mm)



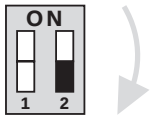
Parallel connection

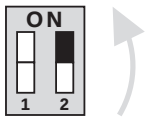


Settings

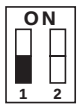
Microswitch **d**

Direction of rotation



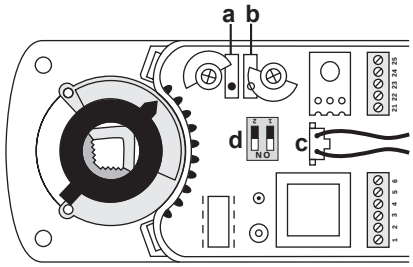


Control signal



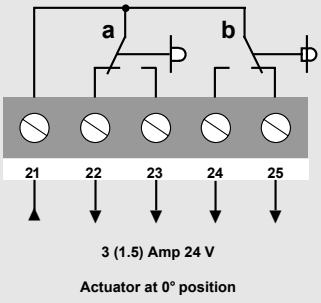
0...20 mA

4...20 mA

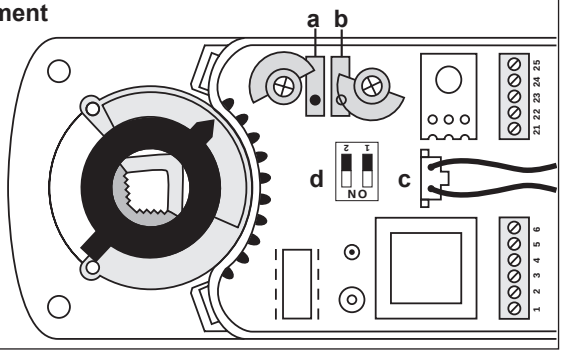


Note:
Up to 5 actuators can be operated in parallel.

Auxiliary switches (S)



Auxiliary switch adjustment



Factory setting:

Switch **a** at 10°
Switch **b** at 80°

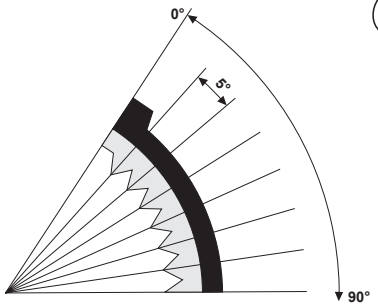
The switch contact points can be changed manually to any required position by turning the switch.

Angle-of-rotation

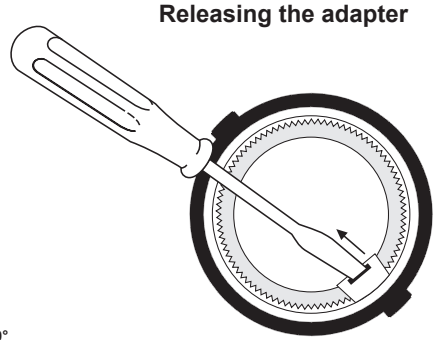
The rotation angle operating range can be set in 5° steps by moving the adapter.

The adapter can be removed simply by pressing the adapter clip on the underside of the actuator.

Angle-of-rotation limiting



Releasing the adapter



For details of installation and commissioning see Service and Data Information (SDI)

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M9108, M9116 & M9124
Proportional Electric Damper-Actuator (24V)

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

The universal stem adapter with rotation limiting combined with it's compact design make this actuator highly versatile.

Key Features

- 0(2)...10 VDC and 0(4)...20 mA control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10...20 mm Ø
  Square shafts from 10...16 mm a/f
- Low noise level
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops

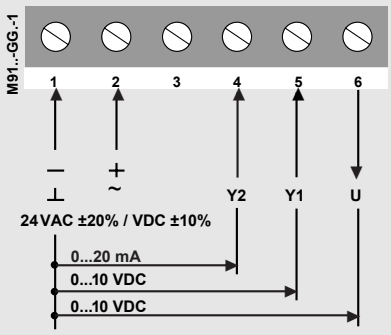
Type/Specifications/Technical data

M91..-GGA-1	Damper actuator 24 VAC
M91..-GGC-1	Damper actuator 24 VAC with 2 adjustable auxiliary switches

Actuators	**Units**	**M9108-GG.-1**	**M9116-GG.-1**	**M9124-GG.-1**
Drive torque	Nm	8	16	24
Damper area approx.	m^2	1.5	3	4.5
Running time	sec	30…45	80…110	125…160
Power supply	V		24 VAC/VDC	
Frequency	Hz		50-60	
Power consumption:				
- operating	W		4.0	
- at end stops	W		0.6	
For wire gauge	VA / I max.		7.5 / 3 A @ 2msec	
Weight	Kg		1.1	
Control signal	Y1		0(2)…10 VDC	
Control signal	Y2		0(4)…20 mA	
Position signal	U		0(2)…10 VDC	
Angle-of-rotation: - working range			90° (93° mech.)	
- limiting			5°…85° in 5° steps	
Auxiliary switch rating			3 (1.5) Amp 24 V	
Noise level			45 dB (A)	
Protection class			II	
Enclosure			IP 40	
Ambient temperature range			–20...50°C	
Ambient humidity			5...95% rH non-condensing	
Maintenance			maintenance-free	
Standards			The actuators meet CE requirements	

Subject to design modifications without notice

Wiring diagram



Adjusting the controls signals

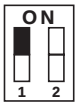
Control signal Y1	0(2)...10 VDC
Input resistance	Ri 100 kΩ
Control signal Y2	0(4)...20 mA
Input resistance	Ri 500 Ω
Position signal U	0(2)...10 VDC
Load resistance	> 50 kΩ

The control signal can be changed to 2...10 VDC and 4...20 mA by moving microswitch 1 to the ON position.

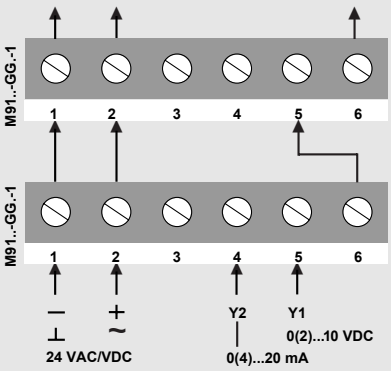
Microswitch **d**

0...10 VDC
0...20 mA

2...10 VDC
4...20 mA



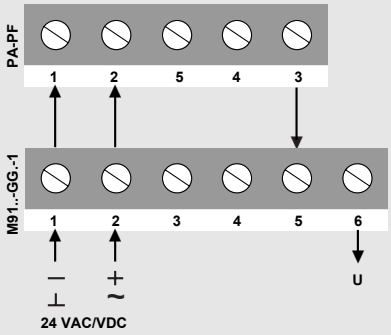
Parallel connection



When M91..-GG.-1 actuators are to be operated in parallel, the output signal U = 0(2)...10 VDC (Terminal 6) of the master actuator must be connected to Terminal 5 of the next slave actuator, etc.

Note:
Up to 5 actuators can be operated in parallel.

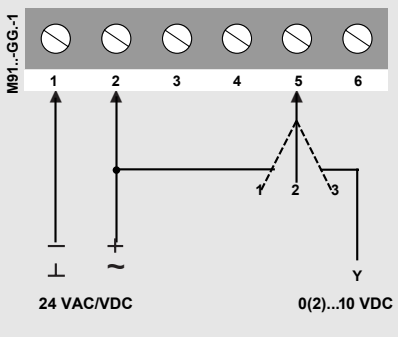
Remote positioner



M91..-GG.-1 actuators can also be controlled by means of a Johnson Controls M9000-PA/PF remote positioner with 0(2)...10 VDC control signal.

Note:
Up to 5 actuators can be operated in parallel.

Override control

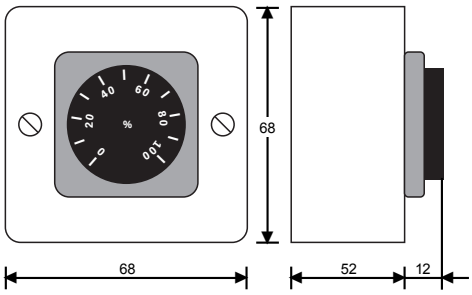


Override control of M91..-GG.-1 actuators can be provided with the circuitry shown opposite.

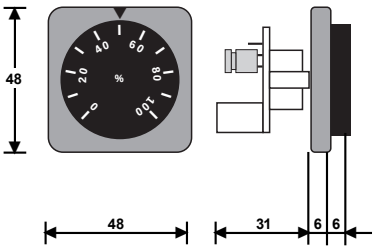
Switch position:
1 = Actuator runs at 10 V
2 = Actuator runs at 0(2) V
3 = Automatic control

Dimensions (mm)

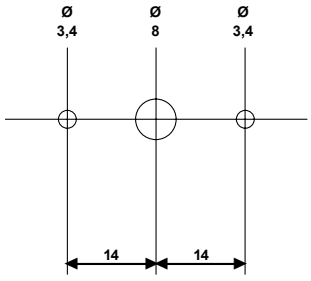
M9000-PA in surface-mounted housing



M9000-PF for flush mounting



Drilling template

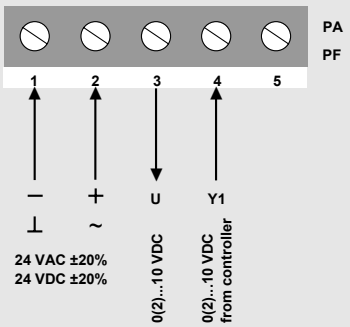


Designations/Specifications/Technical data

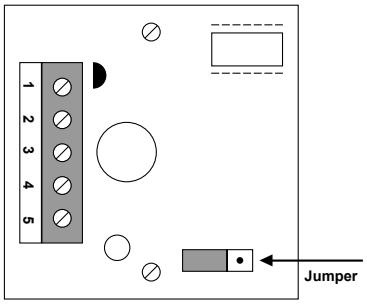
M9000-PA 0...100% Remote positioner for surface mounting
M9000-PF 0...100% Remote positioner for flush mounting

For actuators	Type	M91..-GG.-1
Power supply	V	24 VAC/VDC ±20%
Frequency	Hz	50-60
Output signal U	U	0(2)...10 VDC
Output rating		for up to 5 actuators
Control signal Y1	V	0(2)...10 VDC

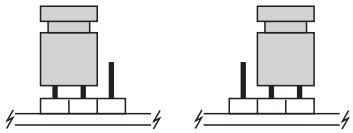
Wiring diagram



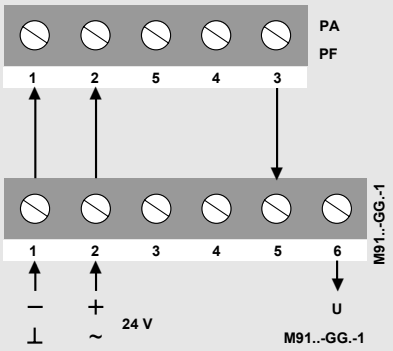
Output signal matching



The output signal 0...10 VDC or 2...10 VDC ist proportional to 0...100% rotation of the adjuster knob.

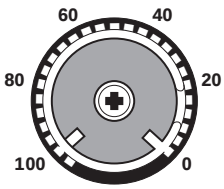


for manual control

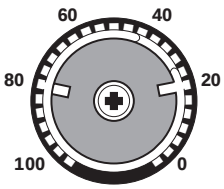


Angle-of-rotation limiting

0...100%



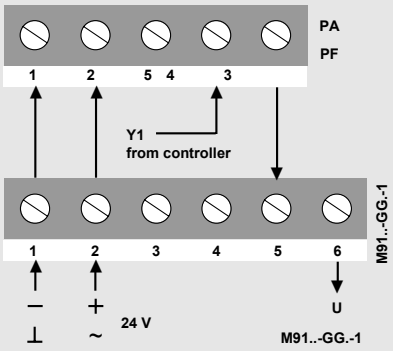
20...80%



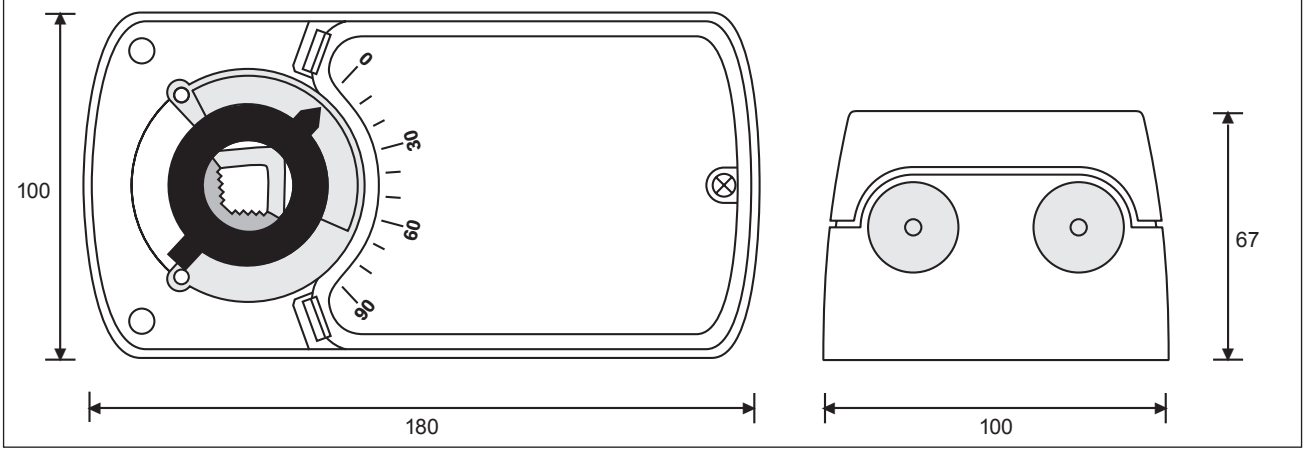
The adjuster knob can be removed by pulling it out of the front plate.
Inside the knob the mechanical limiting of the angle-of-rotation can be adjusted by moving the stop springs.

Factory setting 0...100%.

for minimum limiting



Dimensions (mm)



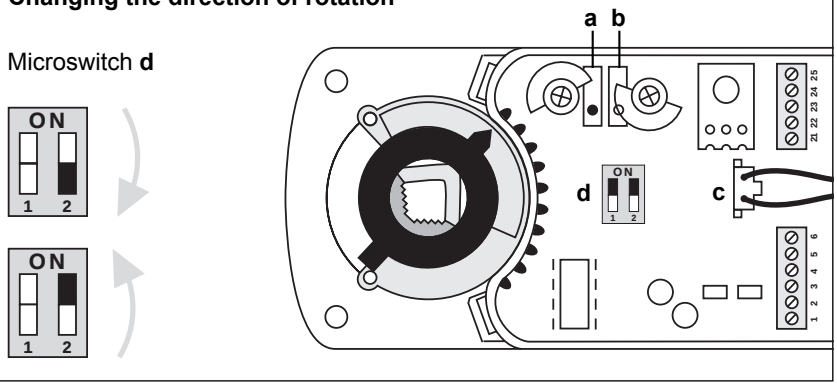
Direction of rotation

In order to reverse the direction of rotation, move microswitch 2 to the ON position - the action of the output signal will also be changed in the process.

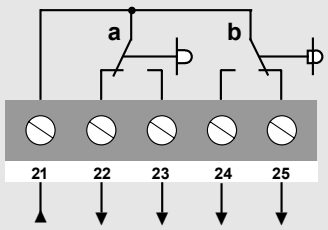
Plug (c) must never be reversed otherwise the motor will not function correctly.

Changing the direction of rotation

Microswitch **d**



Auxiliary switches (S)



3 (1.5) Amp 24 V

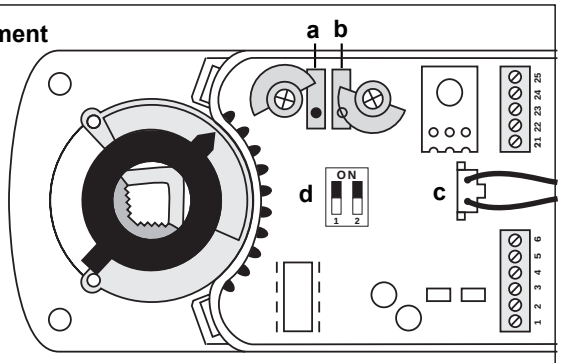
Actuator at 0° position

Auxiliary switch adjustment

Factory setting

Switch **a** at 10°
Switch **b** at 80°

The operating points can be altered as required by simply turning

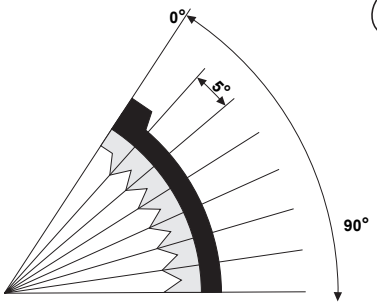


Angle-of-rotation

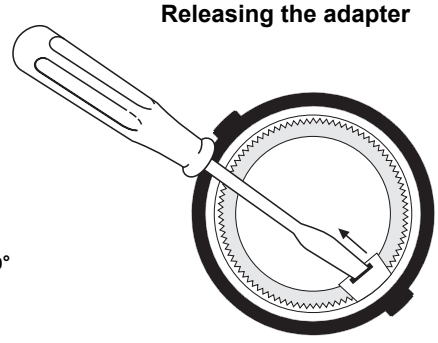
The angle-of-rotation/working range can be adjusted mechanically by repositioning the adapter in 5° steps.

The adapter can be released by simply pressing the clip at the base of the actuator.

Angle-of-rotation limiting



Releasing the adapter



For details of installation and commissioning see Service and Data Information (SDI)

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M9108, M9116 & M9124 Phase Angle or Resistance Controlled Electric Damper-Actuators (24 V)

Application

These Johnson Controls electric actuators have been developed to adjust dampers in ventilation and air conditioning systems.

The universal stem adapter with rotation limiting combined with it's compact design make this actuator highly versatile.

Key Features

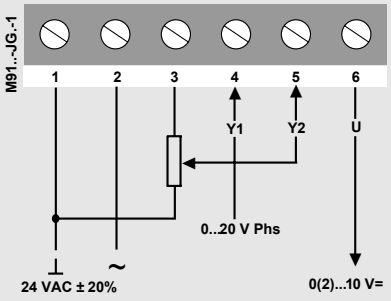
- 0…20 V Phase angle or 135 Ω control
- Paralleling of up to 5 actuators possible
- Screw terminal connections
- Universal adapter for:
  Round shafts from 10...20 mm Ø
  Square shafts from 10...16 mm
- Direction of rotation selection
- Angle-of-rotation limiting
- Manual control by pushbutton
- 2 floating auxiliary switches
- Power saving at end stops
- Shaft min. length 48 mm

Type/Specifications/Technical data

M91..-JGA-1	Damper actuator 24 VAC
M91..-JGC-1	Damper actuator 24 VAC with 2 adjustable auxiliary switches

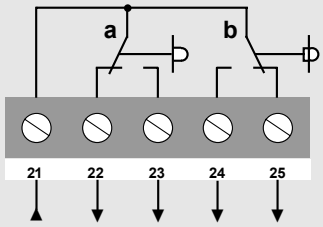
Actuators	Units	M9108-JG.-1	M9116-JG.-1	M9124-JG.-1
Drive torque	Nm	8	16	24
Damper area approx.	m^2	1.5	3.0	4.5
Running time	s	30…45	80…110	125…160
Power supply	V		24 VAC	
Frequency	Hz		50-60	
Power consumption:				
- operating	W		4	
- at end stops			0.8	
For wire gauge	VA / I max.		7.5 / 3.5 A @ 2 msec	
Weight	Kg		1.1	
Control signal	Y1		0…20 V Phase angle	
Control signal	Y2		135 Ω	
Position signal	U		0(2)…10 VDC	
Angle-of-rotation	- working range		90° (93° mech.)	
	- limiting		5°…85° in 5° steps	
Auxiliary switch rating			3 (1.5) Amp 24 V	
Noise level			45 dB (A)	
Protection class			II	
Enclosure			IP 40	
Ambient temperature range			–20...50°C	
Ambient humidity			5…95% rH non-condensing	
Maintenance			maintenance-free	
Standards			The actuators meet CE requirements	

Wiring diagram

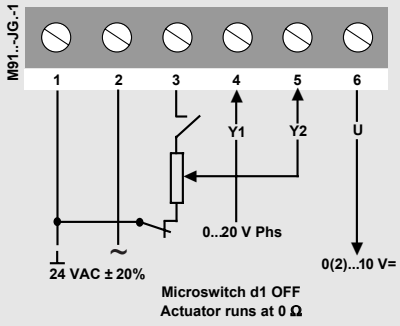


Microswitch d

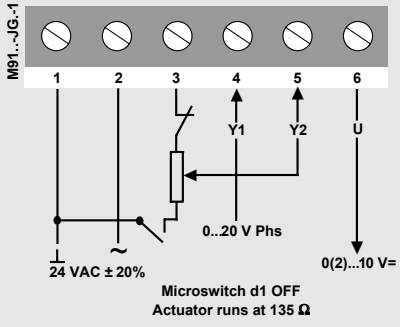
Auxiliary switches (S)



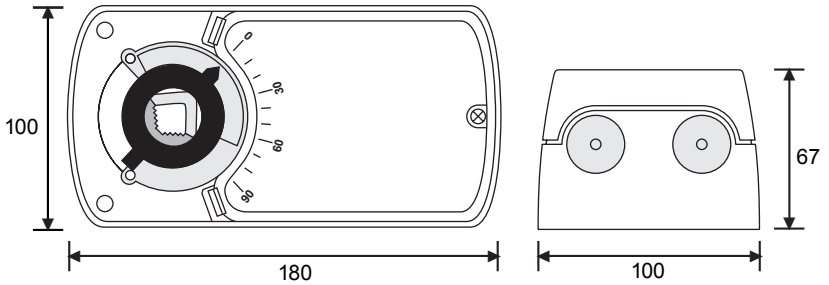
Override Control



Override Control

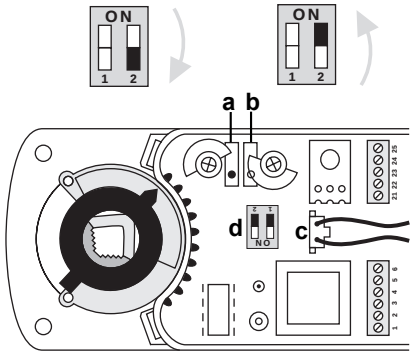


Dimensions (mm)



Changing the direction of rotation

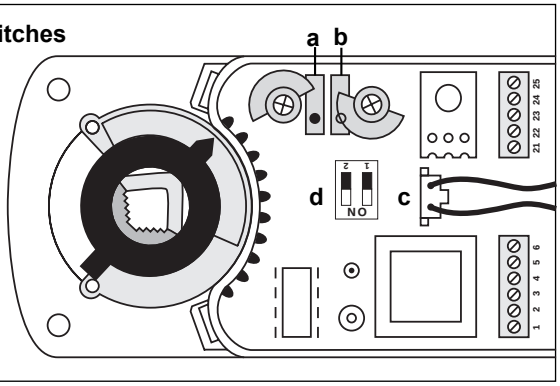
Microswitch **d**



To change the direction of rotation the d2 micro-switch must be set to ON. The action of the output signal will also be changed simultaneously.

To ensure correct motor functionalty never rotate the motor plug (c).

Setting the auxiliary switches



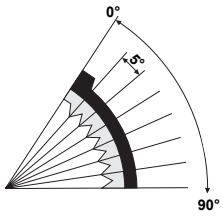
Factory setting:

Switch **a** at 10°
Switch **b** at 80°

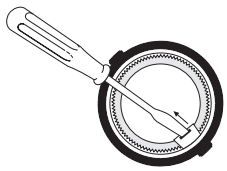
The switch contact points can be changed manually to any required position by turning the switch.

Rotation angle

Angle-of-rotation limiting



Releasing the adapter



The rotation angle operating range can be set in 5° steps by moving the adapter.

The adapter can be removed simply by pressing the adapter clip on the underside of the actuator.

Override Control

Override control capability is achieved by wiring and switch settings as depicted in the wiring diagrams on the left.

For details of installation and commissioning see Service and Data Information (SDI)

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M9116
Proportional Electric Actuator For Mixing Valves

Application

These Johnson Controls electric actuators have been specially designed for the motorised operation of various types of water valves such as mixing valves, butterfly valves and ball valves.
The mechanical design of the actuators is such that, with the aid of mounting kits, they can be used on many different makes of valves and fittings. The universal coupling between the actuator and the final controlling element is simplicity itself to use since it provides both a positive drive and flexibility.

Key Features

- 0…10 VDC control signals and 0…20 mA
- Screw terminal connections
- Universal adapter with knob for manual operation and position indicaton
- Low noise level
- Reversible
- Power saving at end stops

Accessories for mixer mounting kits

- ZMA001 for Esbe mixers
- ZMA002 for Centra-Duplex mixers
- ZMA003 for Holter mixers
- ZMA004 for GF ball valves

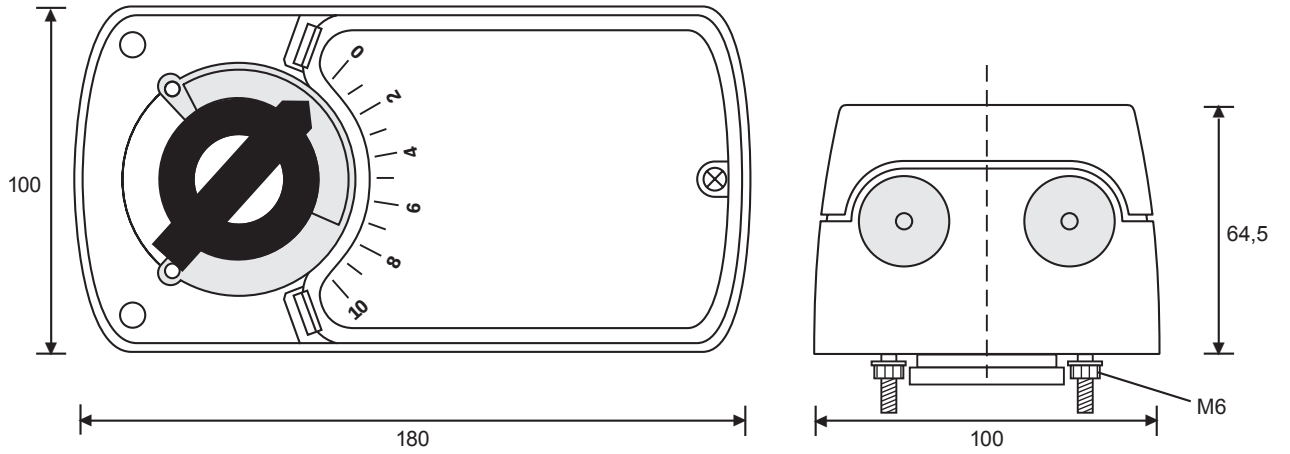
Type/Specifications/Technical data

M9116-GGC-1.02	Mixer actuator 24 VAC/VDC
M9116-GGA-1.02	Mixer actuator 24 VAC/VDC with 2 variable auxiliary switches

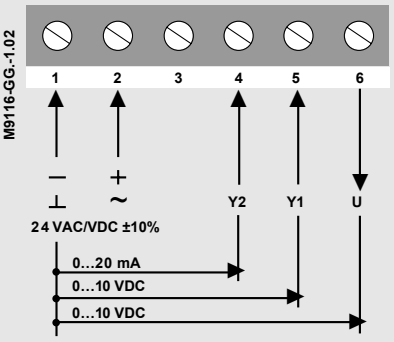
Actuators	**Units**	**M9116-GG.-1.02**
Drive torque	Nm	16
Running time	s	120
Power supply	V	24 VAC
Frequency	Hz	50-60
Power consumption:		
- operating	W	3.0
- at end stops		0.7
For wire gauge	VA / I max.	6.0 / 3.6 A @ 2 msec
Weight	Kg	1.1
Control signal	Y1	0…10 VDC
Control signal	Y2	0…20 mA
Position signal	U	0…10 VDC
Angle-of-rotation	- working range	90° (93° mech.)
	- limiting	none
Auxiliary switch rating		3 (1.5) Amp 24 VAC
Noise level		45 dB (A)
Protection class		II
Enclosure		IP 40
Ambient temperature range		–20...50°C
Ambient humidity		5…95% rH non-condensing
Maintenance		maintenance-free
Standards		The actuators meet CE requirements

Subject to design modifications without notice

Dimensions (mm)



Wiring diagram



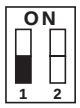
Adjusting the control signals

Control signal Y1 Input resistance	0...10 VDC Ri > 250 kΩ
Control signal Y2 Input resistance	0...20 mA Ri 388Ω
Position signal U Load resistance	0...10 VDC > 10 kΩ

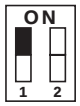
Leave microswitch d-1 at position 1.

Microswitch **d**

Deactivated

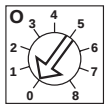


Activated

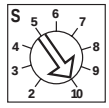


Pot. for signal **p**

Pot. **O**



Pot. **S**



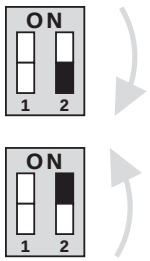
Direction of rotation

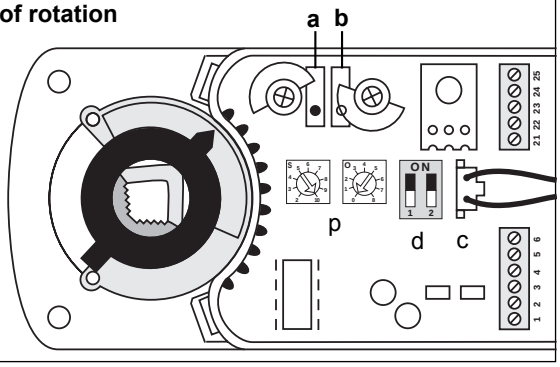
In order to reverse the direction of rotation, move microswitch 2 to the ON position - the action of the output signal will also be changed in the process.

Plug (c) must never be reversed otherwise the motor will not function correctly.

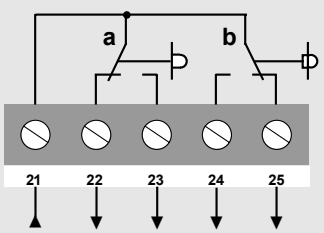
Changing the direction of rotation

Microswitch d





Auxiliary switches (S)



3 (1.5) Amp 24 V

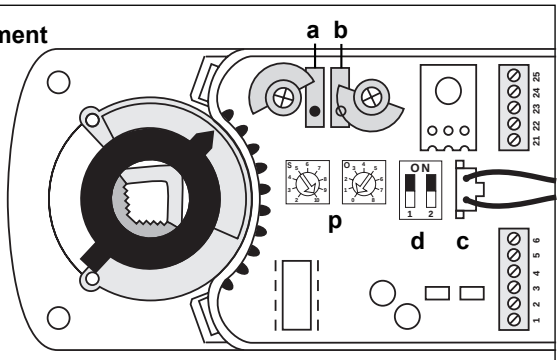
Actuator at 0° position

Auxiliary switch adjustment

Factory setting:

Switch a at 10°
Switch b at 80°

The operating points ca be altered as required by simply turning by hand.



For details of installation and commissioning see Service and Data Information (SDI)

JOHNSON CONTROLS

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