

RA-3000-7410 Electric Actuator

Introuction

The RA-3000-7410 series synchronous motor-driven reversible actuators are available for 3-point (floating) or with electric positioner for 0...10 V control. They feature factory calibrated pressure switches to provide specified close-off ratings.

These actuators are available with 3000 N nominal force and can be used with BF, BD and BB series valves according to the maximum close-off pressure ratings specified.

The RA-3000-7410 series, electric actuators replace the EA-3000-7610 series, which has been discontinued.



RA-3000-7410 Actuator with BD valve

Features and Benefits

<input type="checkbox"/> Uses synchronous motor with force dependent end switches.	Constant running time Fixed close-off force.
<input type="checkbox"/> Models for 3-point and proportional 0...10 V control.	Allows optimum choice of electrical signal.
<input type="checkbox"/> Positioner with adjustable starting point, span, and direct / reverse action.	Provides flexibility in application and allows easy sequencing from only one controller output signal.
<input type="checkbox"/> Active 0...10 VDC position feedback on proportional models.	Provides active signal for independent position monitoring.
<input type="checkbox"/> Optional hand wheel.	Allows manual positioning independent from power supply.

Ordering data

RA-3			-741	
Actuator Supply voltage*)				
5	24 VAC, 60 Hz			
6	24 VAC, 50 Hz			
7	230 VAC, 50 Hz			
Accessories, factory mounted				
00	None			
03	Two auxiliary switches and 2 k Ω feedback pot.			
05	Two auxiliary switches and 135 Ω feedback pot.			
41	Built-in electronic Positioner 0...10 VDC and two auxiliary Switches (only 24 VAC models)			
Hand wheel				
0	None			
1	With hand wheel			

*) For other supply voltage and frequency, please contact your Johnson Controls supplier.

Ordering Procedure

The valves and actuators can be ordered separately or factory mounted. When factory mounted, please add "+M" after the order code for the actuator.

Accessory Kits for in-situ installation

282 3501 114	Cable Entry PG 13,5 (\varnothing 7..11mm) DIN 46320 - FS
--------------	--

Repair parts

EG-0572-7041	Electronic Positioner EPOS 4 plug-in module for field replacement
--------------	---

Actuator - Valve combinations

The RA-3000-7410 series electric actuators, are specifically designed to be used with the BF and BD valve series, to replace the EA-3000-7610. It can also be used in combination with the BB valve series.

The ordering data for these valve bodies are as follows:

● BF series (PN16 flanged valves)

BF-□□□ 2- 2-way PDTTC (NO) DN 65...150
5200

BF-□□□ 8- 3-way mixing DN 65...150
5200

● BD series (PN16 or PN40 flanged valves)

BD-□□□ 2-52□□ 2-way PDTTC (NO) DN 65...150

BD-□□□ 8-52□□ 3-way mixing DN 65...150

BD-□□□ 6-52□□ 3-way diverting DN 65...150

● BB series (PN16 or PN40 pressure balanced, flanged valves)

BB-□□□ 2-52□□ 2-way PDTTC (NO) DN 65...150

Please refer to the BB, BF and BD Flanged Valves Series product bulletins for complete ordering information.

Close-off pressures

Maximum close-off pressures for electric actuator/valve combinations:

Valve Series	Body Size DN				
	65	80	100	125	150
Close-off Pressures (kPa)					
BF PN16	710	440	260	150	90
BD PN16	710	440	260	150	90
BD PN40	590	360	210	120	70
BB PN16	1600				
BB PN40	2000				

Operation

3-point models

Connections	Actuator Stem
1-2	extends
1-3	retracts

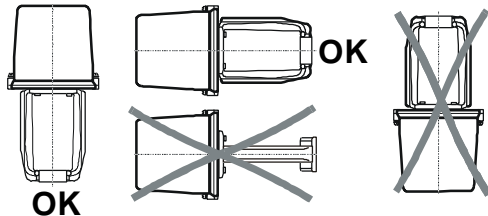
Proportional models

Action Jumper	Input control signal	Actuator Stem
Direct acting	increases decreases	retracts extends
Reverse acting	increases decreases	extends retracts

Mounting instructions

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

- It is recommended that the valves be mounted upright in an easily accessible location. When mounted horizontally, the yoke should be fitted such that the stanchions are positioned vertically, one above the other.



- The actuator must be protected against dripping water, which could enter the housing and damage the mechanism or motor.
- Do not cover with insulating material.
- Sufficient clearance must be allowed for actuator removal (refer to the dimension drawings).
- The valve must be installed so that the plug seats against the flow, as indicated by the arrows on the valve.

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

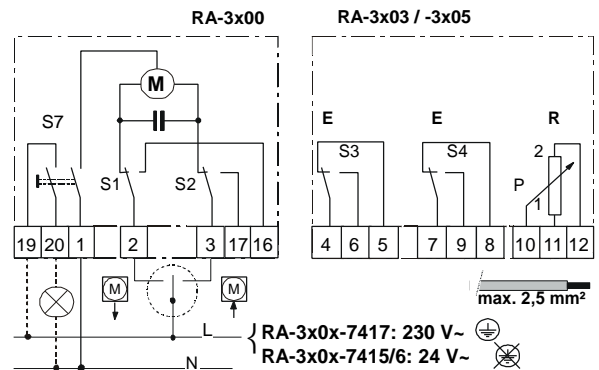
Disconnect the power supply before wiring connections are made to prevent from personal injury.

Equipment Damage Hazard

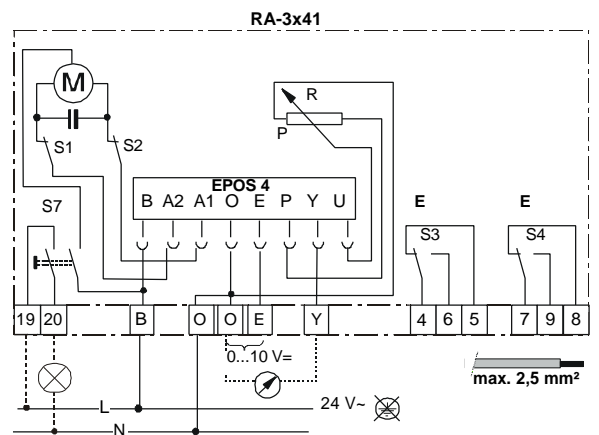
Make and check all wiring connections before applying power to the system. Short circuited or improperly connected wires may result in permanent damage to the unit.

Wiring diagrams

3-point models



Proportional models



Adjustments

WARNING

Shock Hazard

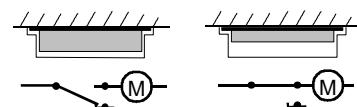
Great care must be taken when the cover is removed (by authorised personnel only) for adjustment or inspection.

In all other cases when the cover is removed the power must be switched off.

Do not touch or attempt to connect or disconnect wires when the electrical power is on.

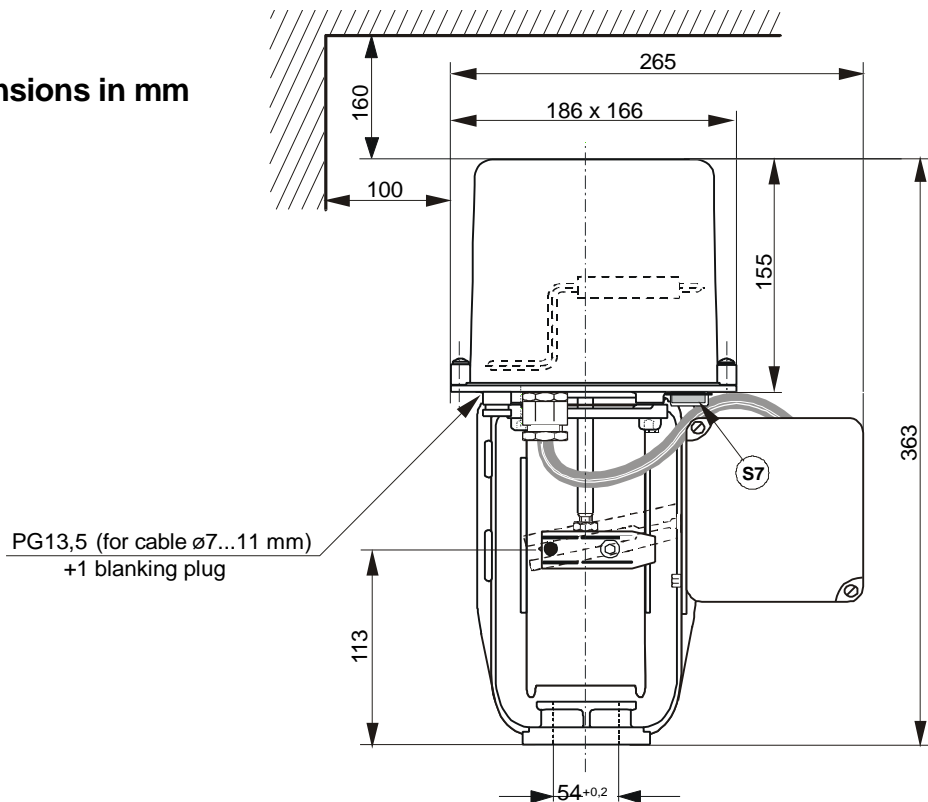
Switch S7

The electrical supply can be switched off manually by means of the button underneath the plate. When it protrudes 5 mm, the power is off, with a 2 mm protrusion the power is on.



Hand wheel (optional) allowing for manual positioning of the valve. The power supply should be switched off by means of switch S7 before the hand wheel is used.

Dimensions in mm



Specifications

Actuator models	RA-3xxx-741x	
Associated valve series and body sizes	<ul style="list-style-type: none"> • PN16: BF, BD and BB DN 65...150 • PN40: BD and BB DN 65...150 	
Type of motor	<ul style="list-style-type: none"> • Synchronous, Reversible 	
Action / Control	<ul style="list-style-type: none"> • 3-point and 3-point with optional 5(3) A / 250 VAC auxiliary switches and 2 kΩ or 135 Ω feedback potentiometer • Proportional with built-in 0...10 V electronic positioner (input impedance 5,6 kΩ) and with 5(3) A / 250 VAC auxiliary switches 	
Hand wheel	Optional	
Supply voltage and frequency*)	24 V $\pm 10\%$, 50 Hz	24 V $\pm 10\%$, 60 Hz 230 V $\pm 10\%$, 50 Hz
Power consumption	16 VA (with positioner 18 VA).	
Nominal force	3000 N	
Nominal stroke	60 mm	
Nominal running speed	50Hz: 4,4 s/mm 60Hz: 3,67 s/mm	
Enclosure Protection	IP 54	
Materials: Stem	Stainless steel (material DIN W-Nr. 1.4305)	
Support base, Yoke and Cover	Die cast aluminium	
Operation and Storage Conditions	-10...+60 $^{\circ}$ C (-10...+50 $^{\circ}$ C with electronic positioner) R.H. 10...90 %, non condensing	
Electrical Connection	screwed connector 2,5 mm ²	
Cable relief	1 x PG 13,5 +1 blanking plug	
Net weight	4,7 kg	
Approvals	European Directives: EMC (89 / 336 / EEC); LVD (73 / 23 / EEC)	

*) For other supply voltage and frequency, please contact your Johnson Controls supplier.

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

Johnson Controls International, Inc.

Headquarters: Milwaukee, WI, USA.

European headquarters: westendhof 8, 45143 Essen, Germany.

European Factories: Lomagna (Italy), Leeuwarden (The Netherlands), Essen (Germany).

Branch Offices: principal European Cities.

Printed in Germany

**Electric Valve Actuator RA-3xxx-741x (ERA 3060)
(Replacement for Actuator EVA 60/3000)****General:**

This Service and Data Information (in brief SDI) comprises the prescribed instructions for safe installation and operation of the electric valve actuator ERA 3060. In the event of difficulties, which cannot be solved with the aid of this SDI, please consult the supplier.

This SDI conforms to the relevant and valid EN-safety standards and the appropriate ordinances and control references of the Federal Republic of Germany. When operating the valve outside the Federal Republic of Germany, it is the responsibility of the operator or system administrator to ensure that valid national control standards are met. The manufacturer maintains all rights for technical changes and improvements at any time. Qualified personnel (see reference) are necessary to the application of this SDI.

Operating personnel shall receive SDI instructions.

Qualified personnel

These are persons conversant with the erection, installation, commissioning, operation and service of the product and in possession of the respective qualifications through their activities and functions, e.g.:

- Instruction about and obligation to maintain adherence to all operative regional / internal ordinances and requirements, conditional to application.
- Training or instruction in accordance with standards of safety in maintenance and utilisation of adequate safety- and protective equipment.
- Training in first aid, etc. (See TRB 700).

Application:

Electric, actuators ERA 3060 are to be used for regulating. Delivery can contain an actuator as a single unit or a ready fitted actuator / valve combination, this combination is tested and ready for operation.

BF, PN16, DN 65 to 150
BD, PN16 + PN40 DN 65 to 150
BB, PN16 + PN40, DN 65 to 150

Danger:

Safe operation of the valve is only ensured if the valve is installed, commissioned and serviced by qualified personnel in compliance with warning references in this SDI. In addition, the general installation- and safety regulations for pipelines, installation construction and the professional use of tools and safety equipment must be guaranteed. Observe unconditionally during all work on the control valve. Ignoring this information may cause physical or material damages.

Storage:

- Storage temperature -40°C to +60°C, dry and free of dirt.
- Do not damage the lacquer. The lacquer is a foundation intended only as a protection against corrosion while in storage and during transport.
- In rooms where moisture or condensation are present use heating or a drying agent to maintain a moisture free atmosphere.

Transport:

- Transport temperature -40°C to +60°C.
- Protect against external forces (shock, Vibration etc.).
- Do not damage the protective lacquer.

Installation site information:

The valve installation site should be easily accessible and provide sufficient room for service and removal of actuators. Manual shut-off valves should be located up and downstream of the control valve, to facilitate service and repairs without draining the piping system. The control valve should preferably be installed vertically with the actuator installed in the upright position. When carrying out inclined to horizontal installation of actuators the stanchions must be aligned vertically one above the other.

Pipes should be insulated to protect actuators against high temperatures, here sufficient room is to be left for servicing the stem seal pack. For trouble free function of the control valve the pipe immediately upstream of the valve should be straight for the length of at least 2x DN and the pipe immediately downstream for the length of at least 6x DN.

Actuator mounting and removal information:

The control valve is normally supplied complete with actuator. It is not permitted to remove or replace an actuator on systems in operation, under operating temperature and pressure. For conversion or service, The actuator mounting procedure should follow the actuator SDI. During mounting procedure the plug should NOT be rotated with downward pressure. Ensure adherence to max. valve operating forces for actuator replacement.

Actuator removal:

In addition to general mounting guidelines and TRB 700 the following points should be observed:

- Pressure free pipe system
- Cooled fluid
- Drained pipe system
- With corrosive or aggressive fluids the pipe system should be vented.
- Work to be performed by qualified personnel only.

Caution:

Electrical wiring must be in conformance with directives for high-voltage installations; voltage supply and frequency must be identical with data on the product nameplate.

Supply line voltage wiring:

Wire gauge min. 1mm².

Supply line voltage fuse:

max. 6 A, 2 A at 24V, observe DIN VDE 116!

Electrical isolation:

Prior to the removal of the actuator cover, e.g. for mechanical maintenance and adjustment, line voltage supply must be disconnected by means of an isolation switch, safeguarded against inadvertent operation.

Electrical connection:

- Select gland size of PG screw fitting, to DIN 46320, to match cable diameter.
- Lead cable through the PG screw fitting to the respective terminals, and then remove insulation from wire tips. Inside the actuator, wires must be routed or fastened so that they are protected against damage by moving or rotating parts and removal or replacement of the actuator cover.
- Fasten ground wire to ground terminal. (Not applicable for 24V version)
- Tighten PG screw fitting to achieve a reliable strain relief.

• **Technical Data:**

Product	ERA 3060		
Valve type	BF, PN16 DN 65-150	BD, PN16 and PN40 DN 65 - 150	BB, PN16 and PN40 DN 65 - 150
Supply voltage Tolerance: ±10%	24V, 50Hz or 24V, 60Hz 230V, 50Hz or 230V, 60Hz		
Power consumption	16VA, 18VA with EPOS		
Motor	Synchronous reversible three-point or with EPOS for 0-10V-control (only 24V)		
Continuous running time	= 50%		
Nominal stroke	60mm		
Force	3000N		
Running speed [s/mm] 50/60 Hz	4.4 / 3.67		
Permissible ambient temperature	-10°C to +60°C -10°C bis +50°C with EPOS		
Permissible ambient humidity	≤ 95% R.H.		
Enclosure	IP 54		
Weight	49 kg		

Switch S 7

The switch „S7“, which cuts the power to the device, is externally accessible and is mounted on the actuator base plate. To operate, push ”S7“.

When the red button (S7) is protruding approx. 2mm, power is on the device.

When the red button protrudes approx. 5mm, power is cut.

The terminals (19 + 20) can be used as potential free feedback contacts when building automation systems.

Optional manual operation

The crank for optional manual operation is mounted on the side of the actuator cover. To operate the actuator manually, remove the plastic plug from the cover and insert the crank. Here it makes sense to use “S7” to isolate the power during this procedure (this prevents automatic return travel on models with EPOS). Manual actuation is achieved by pushing the crank gently inwards and turning in a clockwise or anti-clockwise direction, a friction clutch safeguards the gear train against damage. The desired valve stroke position is visible on the stroke indicator scale. Removing the crank and pushing switch “S7” restores automatic operation.

Close-off pressures:

BF/BD-Valves, PN16

Actuator	DN / Close-off pressures (kPa)				
	65	80	100	125	150
ERA 3060	710	440	260	150	90

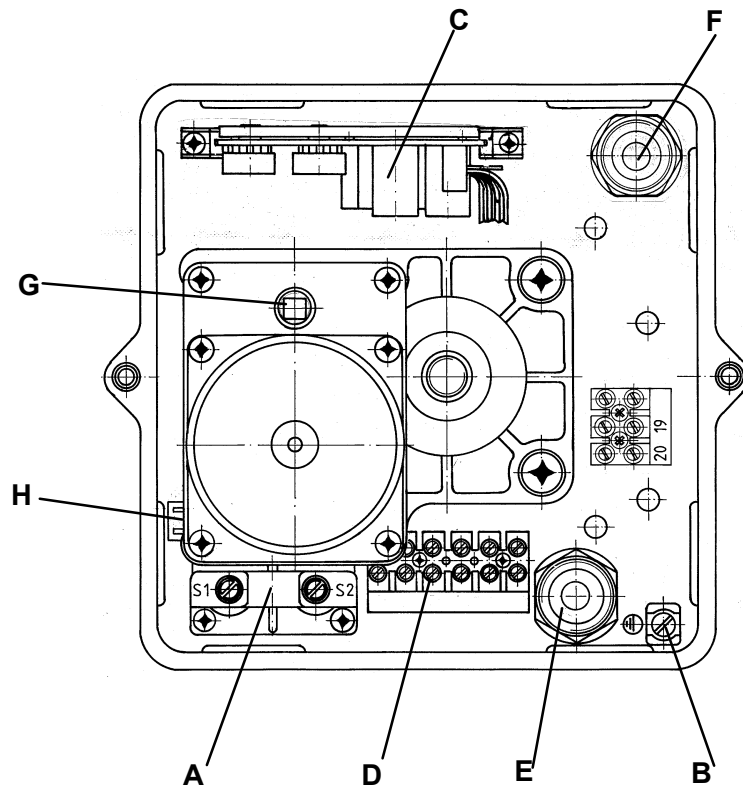
BD-Ventile, PN40

Actuator	DN / Close-off pressures (kPa)				
	65	80	100	125	150
ERA 3060	590	360	210	120	70

Close-off pressures for BB-Valves, DN 65-150, PN 16 = 1600 kPa, PN 40 = 2000 kPa

Additional information:

- A. The limit switches "S1" and "S2" which switch off the motor, are factory calibrated and should not be manipulated.
- B. Ground connection (not 24V version)
- C. Electronic positioner EPOS, Plug-in PCB for modular control.
- D. Terminal for motor and limit switches "S1" and "S2". On models with EPOS the terminal is used for voltage supply and 0...+10 V input. signal
- E. 1 x PG 13.5 screw fitting.
- F. PG 13.5 fitting for connection to external position feedback device.
- G. Square shaft for hand crank.
- H. Switch "S7" to isolate the power to the device during servicing.

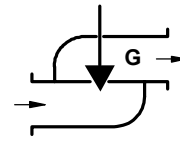
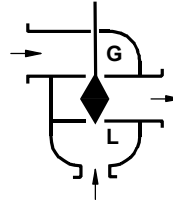
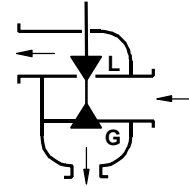


Installation orientation

Do not install the actuator at angles greater than 90° from the vertical position. The cover should always be easily accessible (e.g. for EPOS adjustment) so it may be necessary to rotate the actuator.

The following is valid for the flow direction:

Install the valve so that the plug seats against the direction of flow as indicated by the arrow(s) on the valve body.

**Two-way valve
N.O.****Mixing - GLM****Diverting - LGT**

Bild_021

Actuators supplied as separate units:

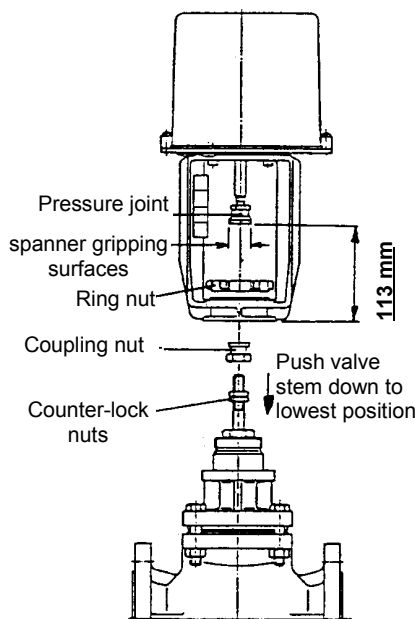
Actuators are pre-set in the factory to facilitate installation with minimum adjustment.

When detaching an actuator from valve:

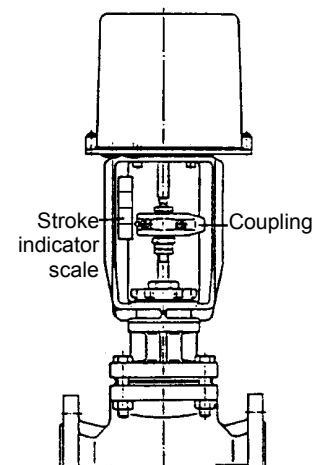
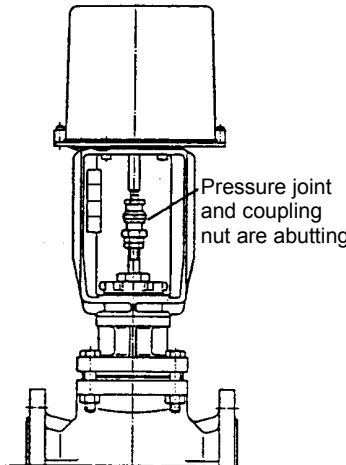
Bring the actuator to the middle position and then carry out the following instructions in reverse order.

When mounting an actuator on a valve:

The reason for fitting the stem coupling is to avoid disturbing the pre-set stem position. Loosen the coupling prior to mounting on valve. Do not disturb stem position! The coupling nut is then screwed onto the valve stem.



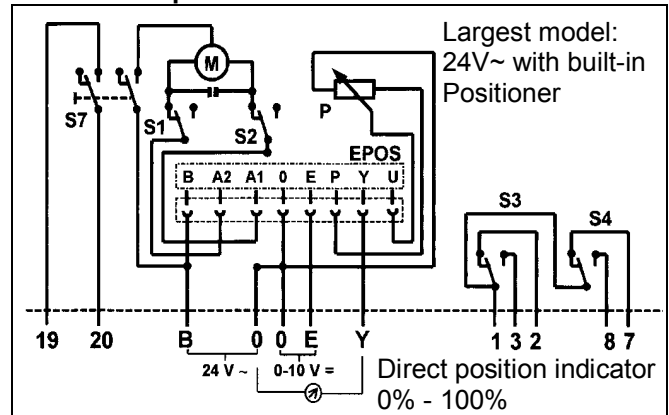
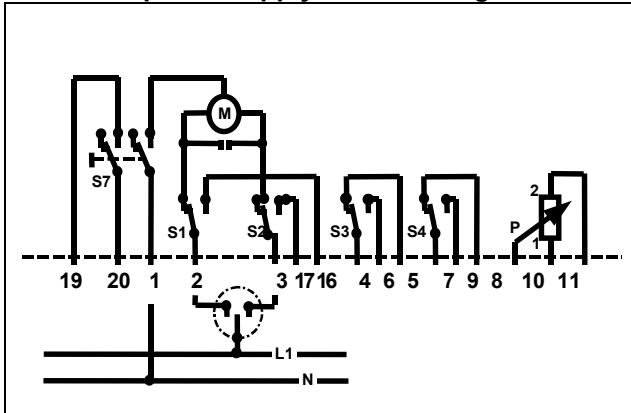
The external, position indication system (with EPOS only) which is not shown in these diagrams, need not be removed, when mounting the actuator on a valve. The position transfer lever (a) remains loose until the adjustment procedure.



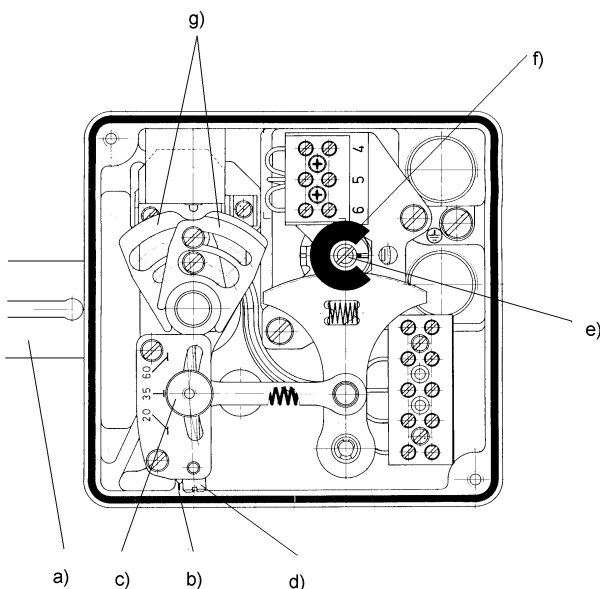
1. Do not disturb the factory setting of 113mm. Hold the open-ended spanner in the position shown.
2. Unscrew one counter nut to the end of the thread
3. Screw on the coupling nut to meet the counter nut.
4. Position the actuator on the valve and tighten the ring nut.
5. Screw the coupling nut on, to abut the pressure joint and counter-lock.
6. Position the coupling clamp and fix. The indication transfer peg must be on the left when a position indicator is in place.
7. Fix the relevant indicator scale.

- Remove the actuator cover and carry out wiring procedure (See wiring diagram).
- Actuator models without positioner and position indicator feedback systems require no further adjustment.

Isolate the power supply before wiring connections are made to prevent electric shock.



Actuator adjustment on models with positioner and external position feedback indicator



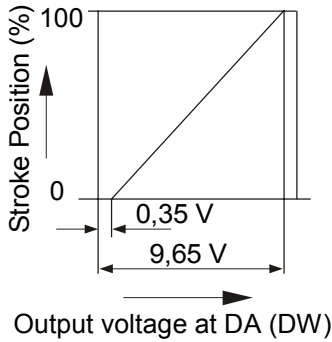
To adjust the potentiometer:

Adjustments may be necessary due to valve stroke tolerances. Switch DW / UW (DA / RA) to DW and adjust the compensatory potentiometer to the middle position.

- Fit the transfer lever loosely.
- Drive the actuator to stroke centre position
- Match the stroke adjustment plate scale marks with those on the base-plate.
- Fix the transfer lever (a). Ensure that the scale mark position is not disturbed.
- Loosen the knurled nut (c) Adjust stroke setting (d) to position "60"
- Connect voltmeter to terminals Y and O.
- Drive actuator to start position and adjust potentiometer zero setting on potentiometer shaft (e) with a screwdriver.

This adjustment is permitted by a built-in friction clutch. The voltmeter scale must indicate 0.35V. If necessary adjust using the compensatory potentiometer (at rear of PCB). The potentiometer shaft (e) has an indication scale (f), which facilitates easier rotation-angle-setting control.

- Extend actuator stem to stroke limit and note voltage change on voltmeter scale. If the desired rotation-angle or the respective voltage change has not been achieved, readjust the setting by turning the stroke adjustment plate (d). Fasten the knurled nut (c) after each readjustment and correct the zero setting. Check the stroke limit position. The voltmeter must indicate 9.65V.



Caution: If the control mode is to be set directly to reverse action (UW), then it is to be observed that the position indication at 0 % stroke, is 0V and at 100 % stroke, approx. 9.3V.

Operation

Valve actuator without positioner

- Terminal connection 1 + 2:** Actuator stem is extended.
- Terminal connection 1 + 3:** Actuator stem is retracted.

Valve actuator with positioner

With 0V on terminal E:

- Direct action (DW):** Actuator stem is extended.
- Direct action (UW):** Actuator stem is retracted.

Y output
0 Volt
10 Volt

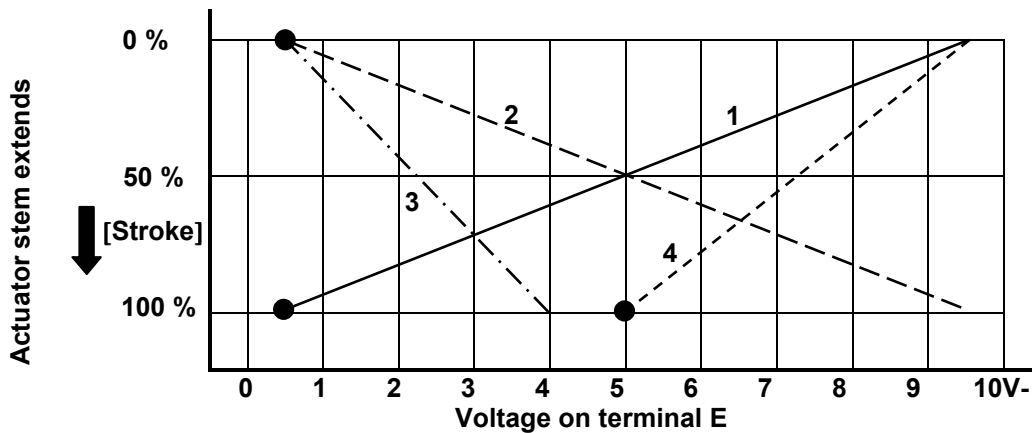
Note:

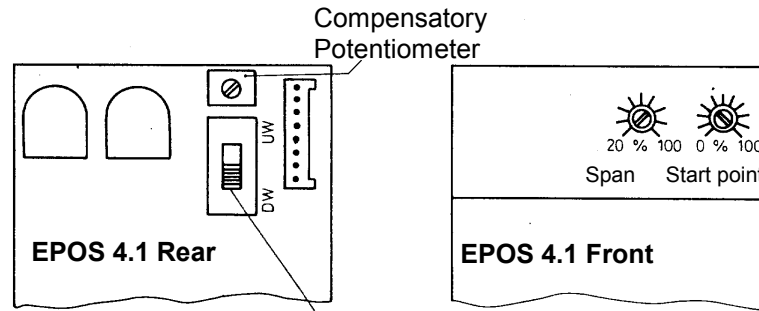
Parallel operation of several valve actuators without built-in positioner is only possible using isolation relays.

Electronic Positioner EPOS

Actuators for 0...10V-control are fitted with an electronic Positioner EPOS. The EPOS is a company made PCB. Span, start point and action are adjustable.

- Curve 1** Direct action (DW)
Start point 0.5V
Span 9V
- Curve 2** Reverse action (UW)
Start point 9.5V
Span 9V
- Curve 3** Reverse action (UW)
Start point 4V
Span 3.5V
- Curve 4** Direct action (DW)
Start point 5V
Span 4.5V



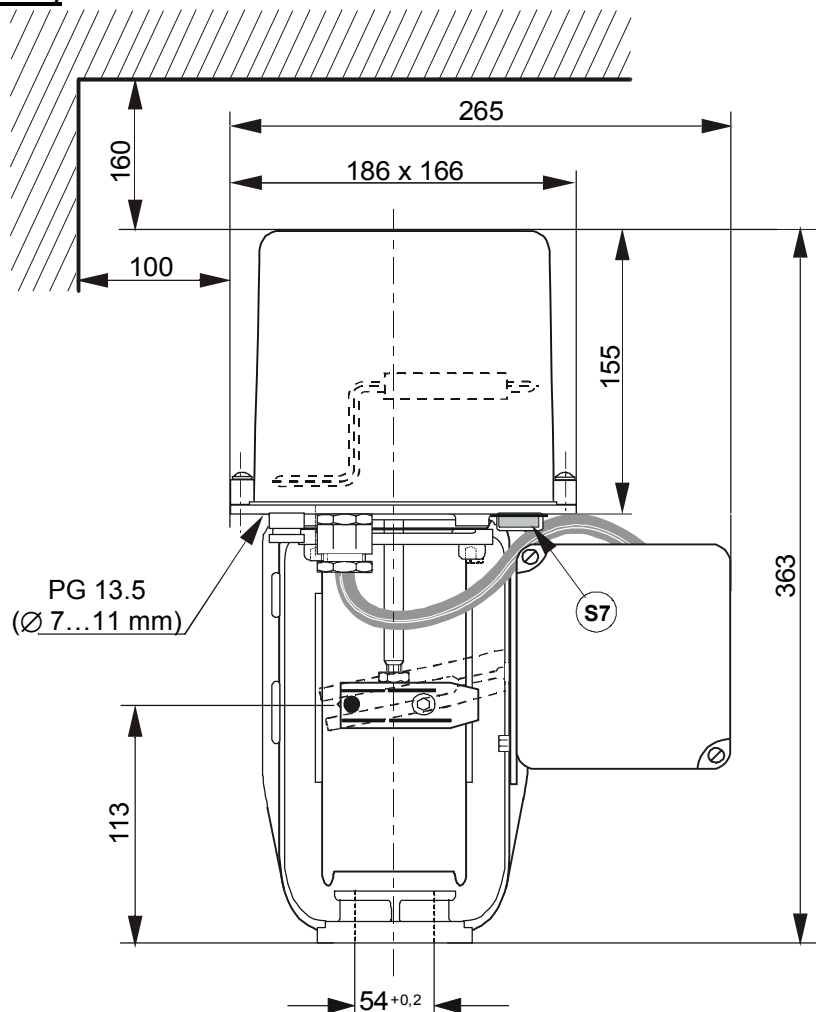


DW (DA) = Direct action Switch for DA and RA
 UW (RA) = Reverse action

Commissioning:

- Prior to commissioning a new installation, or re-commissioning after repairs or service, ensure that:
 - Correct installation- and assembly work has been completed.
 - Only qualified personnel carry out commissioning.
 - Correct functional position of the valve is ascertained.
 - Maintenance of existing protective facilities is carried out.

Dimensions (in mm)



DECLARATION OF CONFORMITY

We

Johnson Controls
JCI-Regelungstechnik GmbH
Westendhof 8
D-45143 Essen

declare under our sole responsibility that the product

Electrical actuator:

RA-3xxx-741x (ERA3060)

to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

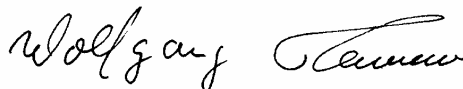
EN 50081-1; EN 50082-1; EN 60335-1

Following the provisions of Directive(s)

EMV directive 89/336/EEC
Amendment 91/263/EEC, Amendment 92/31/EEC, Amendment 93/68/EEC,
Amendment 93/97/EEC

Low voltage directive 73/23/EEC
Amendment 93/68/EEC

D-45143 Essen, 12.01.2000



W. Tessmer (Managing Director)

JOHNSON
CONTROLS

*Exceeding Your
Expectations!*