INSTALLATIONS OCH BRUKSANVISNING

PA Ventiler AB
EN DEL AV BEIJERTECH

GO WITH OUR FLOW

INSTALLATIONSINSTRUKTIONER

ALLMÄNNA RIKTLINJER:

• Se till att ventilerna som ska användas är lämpliga för installationens förhållanden (typ av vätska, tryck och temperatur).
• Se till att ha tillräckligt med ventiler för att kunna isolera rörsektionerna samt lämplig utrustning för underhåll och reparation.
• Se till att ventilerna som ska installeras har rätt tryckklass för att kunna stödja kapaciteten för deras användning.
• Installation av alla kretsar bör säkerställa att deras funktion kan testas automatiskt regelbundet (minst två gånger om året).

INSTALLATIONSINSTRUKTIONER:

• Innan du installerar ventilerna, rengör och ta bort alla föremål från rören (särskilt bitar av tätning och metall) som kan blockera och blockera ventilerna.
• Se till att båda anslutningsrören på vardera sidan av ventilen (uppströms och nedströms) är inriktade (om de inte är det kanske ventilerna inte fungerar korrekt).
• Se till att de två sektionerna av röret (uppströms och nedströms) matchar, ventilenheten kommer inte att absorbera några luckor. Eventuella förvrängningar i rören kan påverka anslutningens täthet, ventilens funktion och kan till och med orsaka brott. För att vara säker, placera satsen på plats för att säkerställa att monteringen kommer att fungera.
• Om rörsektioner inte har sitt slutliga stöd på plats, bör de fixeras tillfälligt. Detta för att undvika onödig belastning på ventilen.
• Dra åt bultarna i kors.
• Tryckprov bör utföras med rengjorda rör
• Tryckprover måste göras med partiell öppning. Trycket bör inte överstiga ventilspecifikationerna enligt EN 12266-1 eller API 598.
• Trycksättning bör göras gradvis för att undvika vattenslag.
• Det rekommenderas att manövrera ventilen (öppna och stänga) 1 till 2 gånger per år
• För en installation i ATEX-området, kontrollera ledningsförmågan mellan ventilen, uppströms röret och nedströms röret och se till att röret är anslutet till jord.

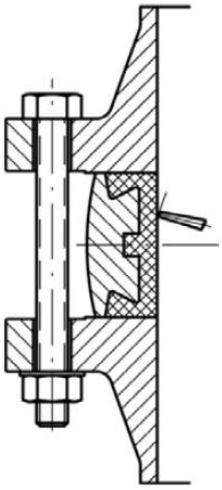
PA VENTILER AB • Sagbäcksvägen 3B, 437 31
Lindome • Tel 031-99 25 00 • Fax 031-99 25 03 •
info@paventiler.se • paventiler.se

INSTALLATIONS OCH BRUKSANVISNING

PA Ventiler AB
EN DEL AV BEIJERTECH

GO WITH OUR FLOW

MAXIMALA ÅTDRAGNINGSMOMENT FÖR BULTNING AV FLÄNSAR:



		Maximalt moment (Nm)			
	Bult typer	5,6 / A307 Gr.B	8,8 / A193 B7	10,9	12,9
Bultar DN	M12 (1/2'')	41,16	84,28	117,6	142,1
	M14 (9/16'')	66,64	132,3	186,2	225,4
	M16 (5/8'')	102,9	205,8	289,1	347,9
	M18 (3/4'')	142,1	284,2	396,9	475,3
	M20 (3/4'')	196	401,8	568,4	676,2
	M22 (7/8'')	259,7	539	764,4	911,4
	M24 (1'')	338,1	695,8	980	1176
	M27 (1''1/8)	499,8	1029	1470	1764
	M30 (1''1/4)	666,4	1421	1960	2352

REKOMMENDERADE ÅTDRAGNINGSMOMENT FÖR BULTNING AV FLÄNSAR:

DN	32/125	150-200	250-300	400-450	500	600
Bultar moment (Nm)	95	185	320	370	620	670

Dessa värden är vägledande och måste anpassas till serviceförhållandena, de bultar som används och typen av flänsar som används.

PA VENTILER AB • Sagbäcksvägen 3B, 437 31
Lindome • Tel 031-99 25 00 • Fax 031-99 25 03 •
info@paventiler.se • paventiler.se

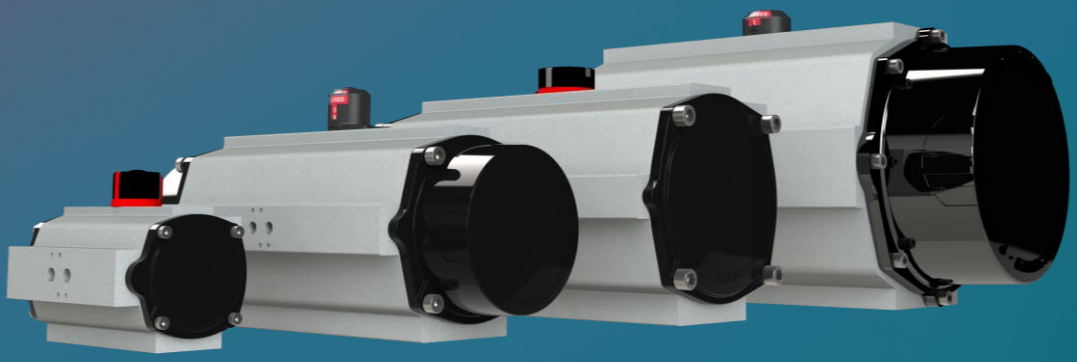
ISO 9001
ISO 14001
BUREAU VERITAS Certification

ACTREG

POWER IN AUTOMATION

R&P SERIES

PNEUMATIC RACK AND PINION ACTUATOR



Installation and Operating Manual

Manufacturing program:

CE Ex II 2 G D

Quality Management:

ISO 9001

BUREAU VERITAS Certification

Safety Integrity Level SIL 3 IEC 61508 / IEC 61511

INDEX

1. Summary

This manual provides the users all the necessary information for the correct manipulation and operation the actuator. The ADA and ASR series of ACTREG actuators, are pneumatic rack and pinion actuators for operate quarter-turn (90º) valves. These actuators are manufactured in accordance with strict quality standards and assure reliability and safety in your specific service.

The ADA and ASR series actuators are available for Ball Valves, Butterfly Valves, Plug Valves and all the 90º rotation valves, widely applicable to the chemical industry, petrochemical, metallurgy, offshore platform, pharmaceuticals, energy, paper, textile and other industries.

MODEL

ASR – 0850 – F1012 – S14 - FC - L - HY

Acting type:
ASR: Spring Return
ADA: Double Acting

Actuator size:
0020 - 4000

Flange connection:
F03 up to F25

Number of springs (Spring Return):
4 up to 14

Temperature Operating Range:
HY: Hydraulic pump system
HW: Handwheel manual override

Fail Position (Spring Return)

H:	- 20 to 120°C
Standard:	- 20 to 80°C
L:	- 40 to 80°C
E:	- 50 to 80°C
EL:	- 60 to 80°C

Fail position (Spring Return):
FC: Closed
FO: Open

2. Working conditions

These actuators are tested according to the UE standards and it Is guaranteed according to EN-15714-3 if the user follows these recommendations and keeps the actuator under the specified working conditions.

Some internal parts of the actuator are made of different materials depending on the ambient temperature range in which must operate:

- High temperature: -20 °C to 120 °C
- Standard Temperature: -20 °C to 80 °C
- Low Temperature: -40 °C to 80 °C
- Extreme temperature: -50 °C to 80 °C
- Extreme Low Temperature: -60 °C to 80 °C

The operating pressure is the range of pressure where the actuator can operate and ensure the lifetime of the actuator. The design pressure is the maximum pressure that can resist the actuator, in static conditions, without danger.

- Operating pressure: 0 to 7 bar
- Design pressure: 12 Bar

The operating medium of the actuator is dry and clean air.

3. Technical data

TECHNICAL PROPERTIES OF THE EQUIPEMENT

Item	0010	0020	0040	0080	0130
Material Body	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized
Material Covers	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating
Volume (L)	0.07	0.13	0.27	0.64	0.77
Max Pressure Service (bar)	7	7	7	7	7
Operating Pressure (bar)	8	8	8	8	8
Design pressure (bar)	12	12	12	12	12
Service temperature min/max (ºC)	See note 1*	See note 1*	See note 1*	See note 1*	See note 1*
Fluid Group	G2	G2	G2	G2	G2
Fluid Contained	Air	Air	Air	Air	Air
Category / Module	III / H1	III / H1	III / H1	III / H1	III / H1

Item	0200	0300	0500	0850	1200
Material Body	EN – AW - 6063 + 25µm Anodized	EN – AW - 6063 + 25µm Anodized	EN – AW - 6063 + 25µm Anodized	EN – AW - 6063 + 25µm Anodized	EN – AW - 6063 + 25µm Anodized
Material Covers	EN – AC – 46500 + Epoxy coating	EN – AC – 46500 + Epoxy coating	EN – AC – 46500 + Epoxy coating	EN – AC – 46500 + Epoxy coating	EN – AC – 46500 + Epoxy coating
Volume (L)	1.2	1.96	2.95	4.7	6.95
Max Pressure Service (bar)	7	7	7	7	7
Operating Pressure (bar)	8	8	8	8	8
Design pressure (bar)	12	12	12	12	12
Service temperature min/max (ºC)	See note 1*	See note 1*	See note 1*	See note 1*	See note 1*
Fluid Group	G2	G2	G2	G2	G2
Fluid Contained	Air	Air	Air	Air	Air
Category / Module	III / H1	III / H1	III / H1	III / H1	III / H1

Size	1750	2100	2500	4000
Material Body	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized	EN – AW - 6063 Anodized
Material Covers	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating	EN – AC – 46500 Epoxy coating
Volume (L)	9.8	11.6	15.6	24
Max Pressure Service (bar)	7	7	7	7
Operating Pressure (bar)	8	8	8	8
Design pressure (bar)	12	12	12	12
Service temperature min/max (ºC)	See note 1*	See note 1*	See note 1*	See note 1*
Fluid Group	G2	G2	G2	G2
Fluid Contained	Air	Air	Air	Air
Category / Module	III / H1	III / H1	III / H1	III / H1

Note 1:

Minimum and max temperatures for:

High temperature: **-20ºC / 120ºC**

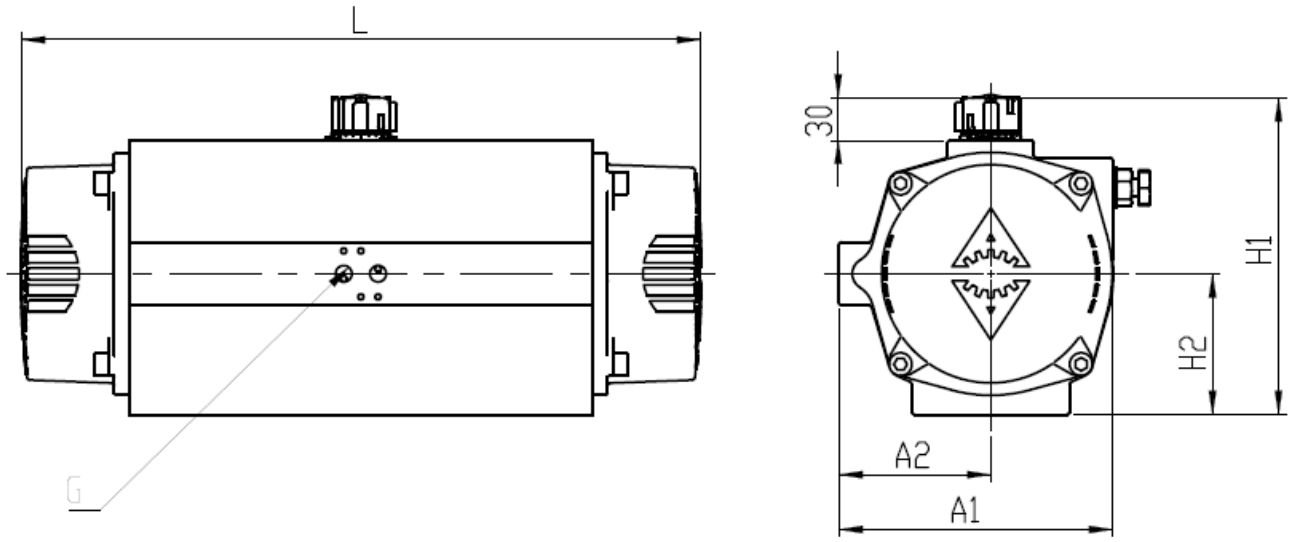
Standard: **-20ºC / 80ºC**

Low temperature: **-40ºC / 80ºC**

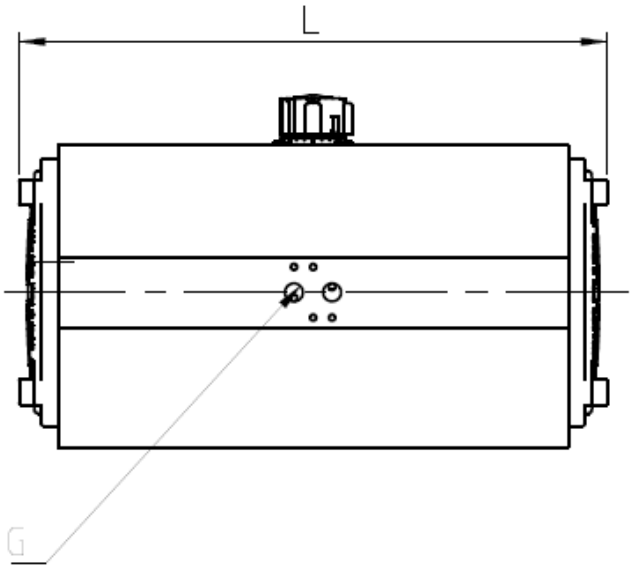
Extreme temperature: **-50ºC / 80ºC**

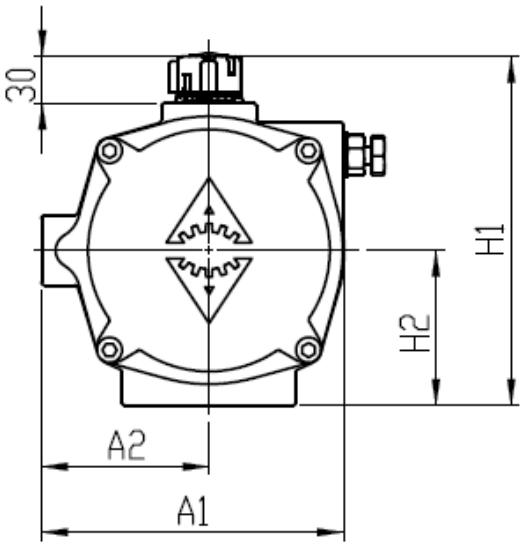
Extreme low temperature: **-60ºC / 80ºC**

3.1. Dimensions



Size	L	H1	H2	A1	A2	G
20	163	96	34	76	48	
40	195	115	45	91	56	
80	217	137	55	111	66	
130	258	147	60	122	71	
200	299	165	70	135.5	78	
300	348.5	182	80	152.5	86	
500	397	199	85	173	96	G1/4” DIN 259
850	473	221	98	191.5	106	
1200	560	249	114	212.5	116	
1750	601	280	130	242.5	131	
2100	702	313	147	276.5	148	
2500	738	383	176.5	356	177.5	
4000	940	434	201	415	213	

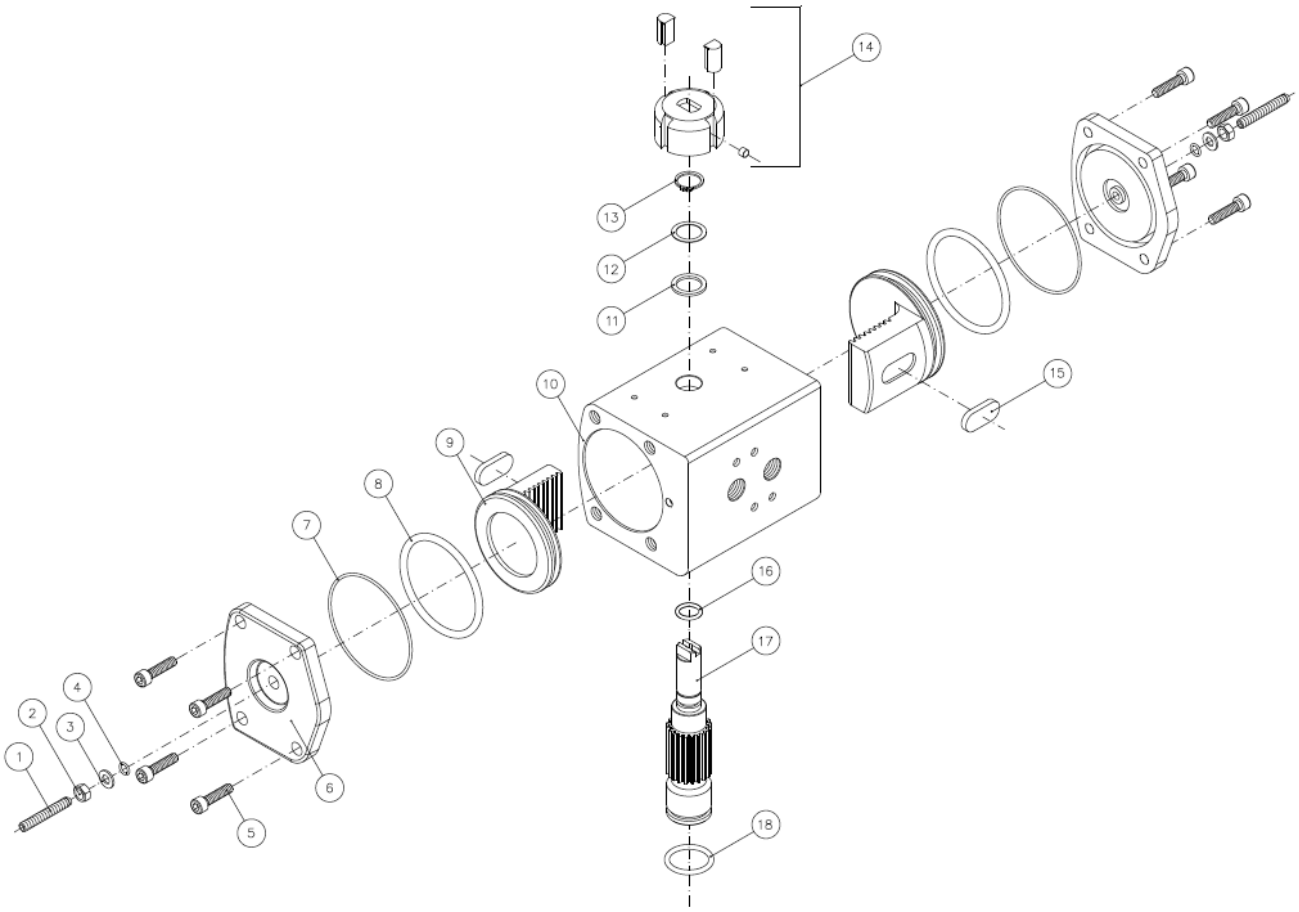




Size	L	H1	H2	A1	A2	G
10	100	76	23	56	33	G1/4" DIN 259
20	145	96	34	76	48	
40	158	115	45	91	56	
80	177	137	55	111	66	
130	196	147	60	122	71	
200	225	165	70	135.5	78	
300	273	182	80	152.5	86	
500	304	199	85	173	96	
850	372	221	98	191.5	106	
1200	439	249	114	212.5	116	
1750	461	280	130	242.5	131	
2100	510	313	147	276.5	148	
2500	518	383	176.5	356	177.5	
4000	630	434	201	415	213	

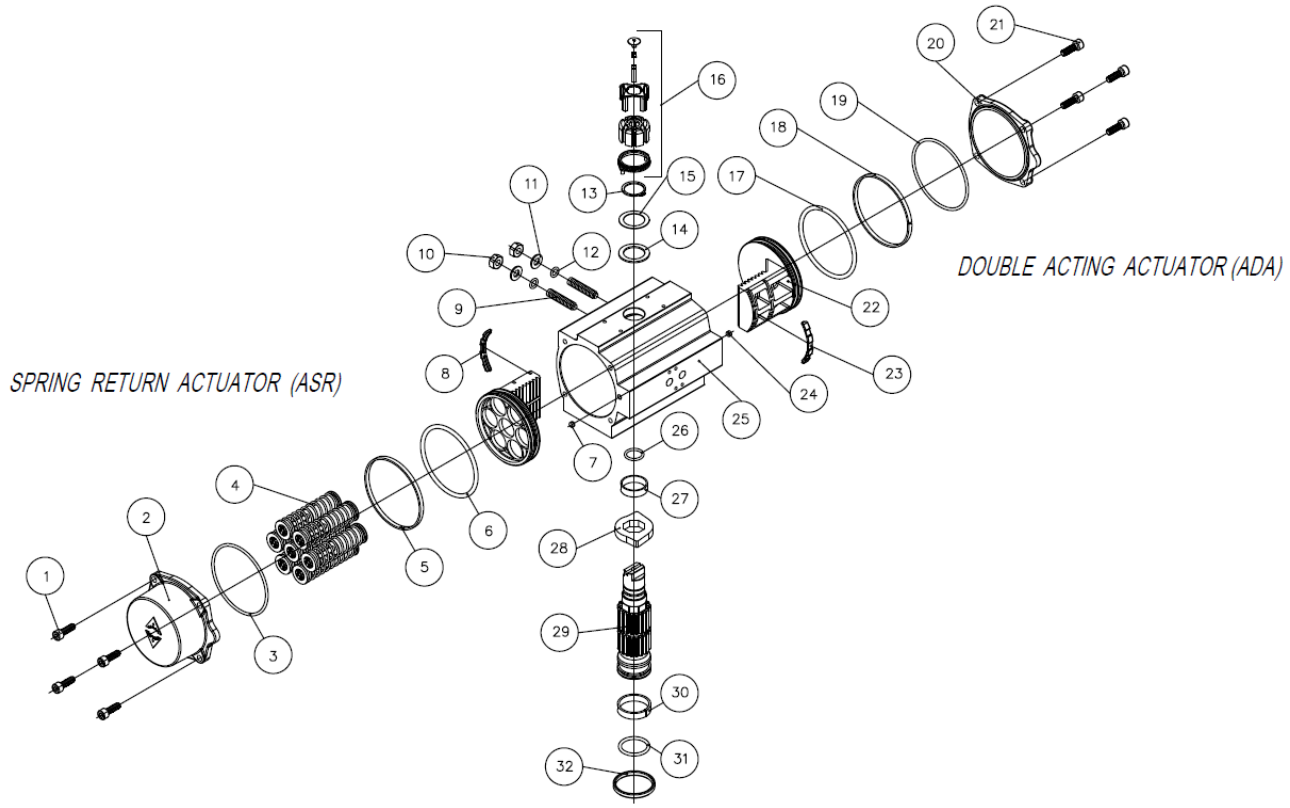
4. Part list

Bill of material for the actuator of size 0010



№	Name	№	Name	№	Name
1	Bolt	**7**	O-Ring	**13**	Slip washer
2	Nut	**8**	O-Ring	**14**	Position indicator
3	Washer	**9**	Piston	**15**	Slide piston
4	O-Ring	**10**	Body	**16**	O-Ring
5	Bolt	**11**	Soft pinion washer	**17**	Pinion
6	End cap (DA)	**12**	Pinion washer	**18**	O-Ring

Bill of material for the single and double acting actuators from sizes 0020 to 4000



Nº	Name	Nº	Name	Nº	Name	Nº	Name
1	Bolt	**9**	Screw	**17**	O-Ring	**25**	Body
2	End cap (SR)	**10**	Nut	**18**	Slide Ring	**26**	O-Ring
3	O-Ring	**11**	Washer	**19**	O-Ring	**27**	Upper pinion bearing
4	Spring (SR)	**12**	O-Ring	**20**	Cover (DA)	**28**	Stopper
5	Slide Ring	**13**	Slip washer	**21**	Bolt	**29**	Pinion
6	O-Ring	**14**	Soft pinion washer	**22**	Piston	**30**	Slide Ring
7	Plug air stop	**15**	Pinion washer	**23**	Slide piston	**31**	O-Ring
8	Slide piston	**16**	Position indicator	**24**	Plug air stop	**32**	Centering ring

5. Installation and Commissioning

The ACTREG actuator must be installed per the standard practices outlined in these paragraphs. The environment must be checked to verify that environmental conditions do not exceed the specified range.

These are some tips for the correct and safe installation:

- Check the packaging is fully secure in the event that it is to be moved.
- Always use endorsed chains and mooring straps of sufficient strength for moving the Actuator or the crates. Make sure they are in good condition. The weight of the crates is specified on them, and the weight of the actuators is indicated on the corresponding drawings.
- Hold the boxes by the marked mooring points.
- Never pass an actuator or a crate through the air over a person.
- The storage of the actuators must be carried out according to O&M, operation and maintenance manual.
- When opening the crates, be careful with packing nails. Never leave the point of a nail sticking out, remove the nail completely from the crate if necessary. Do not handle crates with bare hands are there could be splinters.
- When the actuator is to be installed at a height above the ground, follow local safety regulations on working at heights.
- The installation should be avoided in high temperature, low temperature, high moisture and corrosive environments.

After installing the actuator will proceed to its connection. In the drawing included in this manual you will find where to plug the air connections. First, visually check the threads to make sure they are free of dirt and particles.

Pneumatic piping to the ACTREG actuator shall be kept as short and straight as possible to minimize airflow restrictions and potential clogging. Long or kinked tubes may also increase valve closure time. The pipes mounted on the actuator must not suffer vibrations while it is transported or in the place installed, otherwise the fittings could loose and create leaking points causing malfunction of the actuator.

5.1. Spring combination by type of actuator

ACTREG actuators use a maximum of seven springs on each side, always using a same type of spring independently of the combination of springs that will be used.
The quantity of springs is identified as follows:

*Example: **S14: S** = springs & **14** is the total number of springs assembled in the actuator.*

ASR-20

The actuator ASR-20 uses a minimum of 2 springs and a maximum of 4 springs on each side, according to the diagrams below, depending on the springs combination that require to be assembled.

ASR-40 & 80

The actuators ASR-40 & 80 use a minimum of 2 springs and a maximum of 7 springs on each side, according to the diagrams below, depending on the springs combination that require to be assembled.

ASR-130 ~ 4000

The actuators ASR-130 ~ 4000 use a minimum of 3 springs and a maximum of 7 springs on each side, according to the diagrams below, depending on the springs combination that require to be assembled.

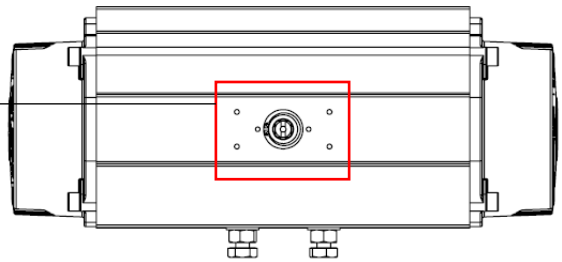
6. Accessories

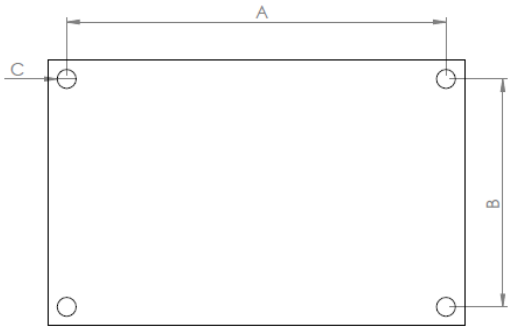
6.1. Device Connections

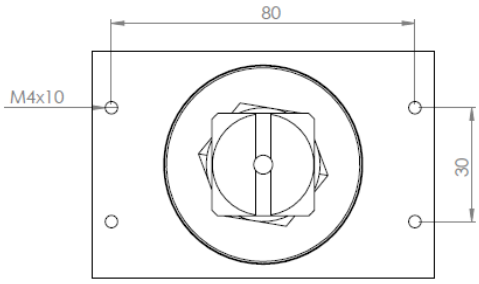
Actreg actuators have different mounting holes on the body to fit different kind of devices, most common devices are limit switch boxes, or positioners. Other type of devices need an extra support like panels, cabs,etc.

Top mounting holes for limit switch boxes and E/P positioners

According to EN 15714-3:2009

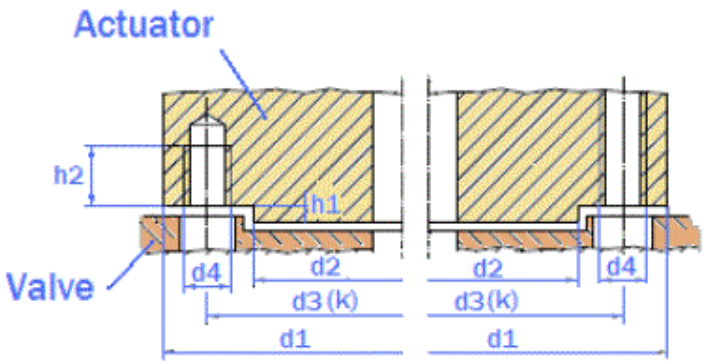






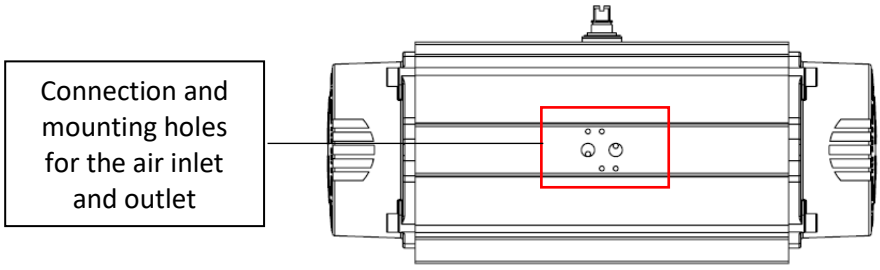
Name	A	B	C
F1416	90	60	M6 x 9
F1625	100	60	M6 x 10
F2530	100	60	M6 x 10
F3035	140	70	M8 x 12
F3540	140	90	M8 x 12
F4048	150	100	M10 x 15
F4860	150	100	M10 x 15

The bottom flange connection of the actuators depends on the body size and it is according to ISO 5211. For valves with another type of connections, it is required coupling adapters and bracket if it is necessary.



Name	Torque max (Nm)	d1	d2	d3	h1 max	Number bolts	d4 Metric
F10	500	125	70	102	3	4	M10
F12	1000	150	85	125	3	4	M12
F14	2000	175	100	140	4	4	M16
F16	4000	210	130	165	5	4	M20
F25	8000	300	200	254	5	8	M16
F30	16000	250	230	298	5	8	M20
F35	32000	415	260	356	5	8	M30
F40	63000	475	300	406	8	8	M36
F48	125000	560	370	483	8	12	M36
F60	250000	686	470	603	8	20	M36

6.2. Air connections



All actuator sizes have the G1/4” according to DIN259. From the actuator of size 10 up to the 1750 have the inlet and outlet holes in horizontal position to each other, like the image above, 2100 and larger have them positioned vertically.

7. Operation

7.1. Auto-Operation

On/Off Control Pneumatic Actuated Valve:

A) The valve open when solenoid valve energized (Failure Close Type)
B) The valve close when solenoid valve de-energized (Failure Close Type)
C) The valve close when solenoid valve energized (Failure Open Type)
D) The valve opens when solenoid valve de-energized (Failure Open Type)

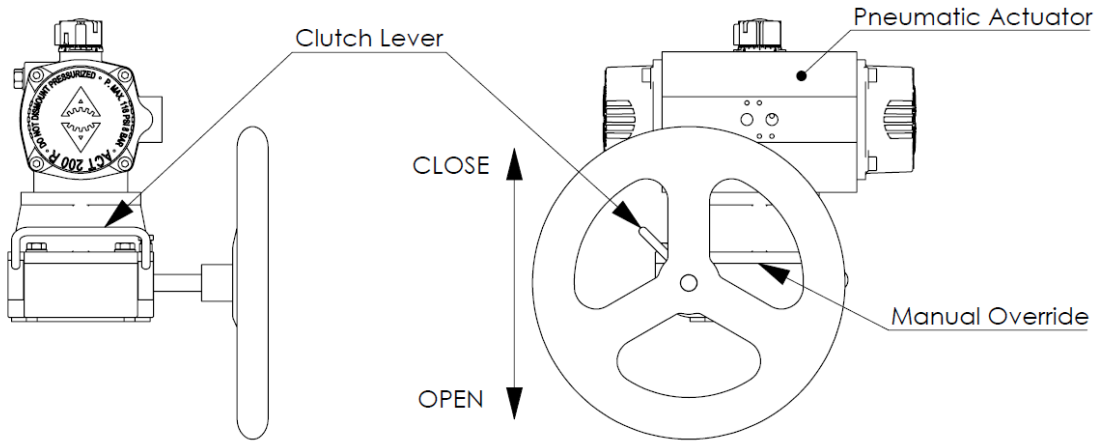
Modulating Control Pneumatic & Hydraulic Actuated Valve:

To give 4-20mADC signal to Electro-Pneumatic positioner (or 0.02 ~ 0.1Mpa to Pneumatic–Pneumatic positioner) the valve position can be proportional controlled by the input signal.

7.2. Manual Operation Way

The manual operating is for an emergency or in case of an energy failure. Some of the systems to manually operate the actuators are mechanical, most of them for actuators that give small and medium torques, and another way is to use a hydraulic manual pump system that helps to run over very high torques.

To run the actuator, release the air firstly, activate the clutch lever, and then rotate the handwheel in anti-clockwise direction until the valve is opened. To return the automatic mode, deactivate the clutch lever.

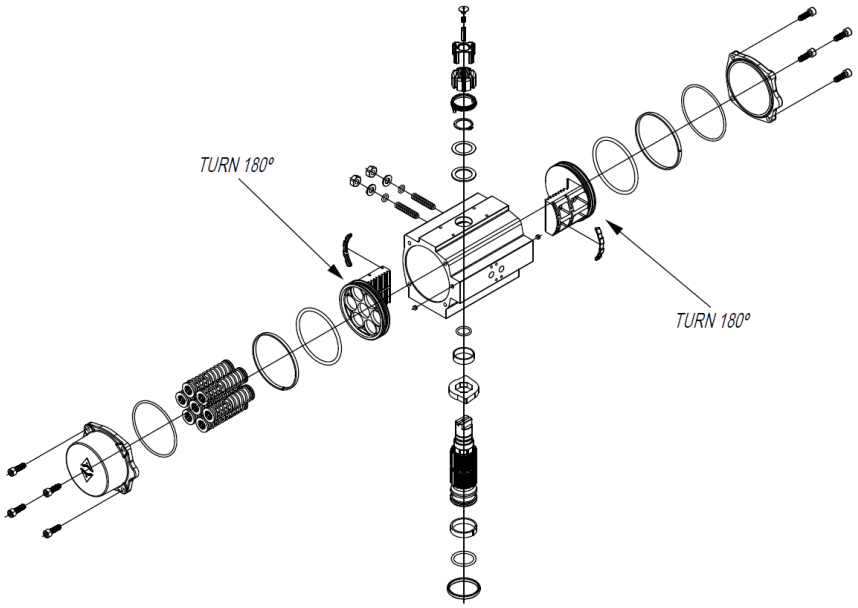


⚠ Before start turning the wheel release the pressure of the actuator. When the operation is finished make sure to remove the screw before put pressure again inside the actuator to protect the system.

8. Fail Position & Regulation

8.1. Change from Fail Close to Fail Open

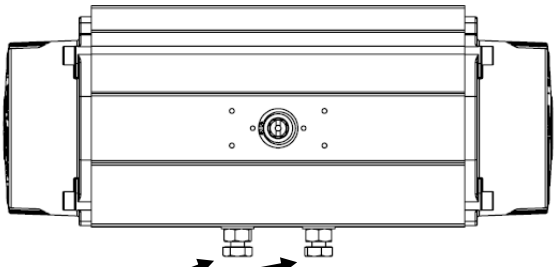
To change the fail position, the actuator must be disassembled and then rotate the pistons 180º so that the main axis rotates in the other direction.



8.2. Stroke Adjustment

ACTREG pneumatic actuators are provided with bi-directional pinion travel stops. The regulation screws, which are located at the front face of the actuator, allow a full ±5° travel adjustment between 85° and 95°. Adjustment of the counter clockwise and clockwise rotation limits is accomplished by unscrewing the locking nuts.

The way of stroke adjustment is loosening the stroke nut firstly, then regulate the stroke by screwing in or out the two adjusting screws. Depending on the failure position of the actuator the closing or the opening adjustment is at one side or the other. But when the bolt is screwed in, the stroke of the actuator is reduced, and when the bolt is screwed out the stroke is longer.



⚠ Please note to tighten the bolt nut after adjusting the appropriate on/off position. Do not adjust more than 5° each side, designed by the manufacturer. Internal parts could be damaged.

9. Functional Safety relevant Specifications

Safety Function:

The ACTREG pneumatic actuators are typically used with another interface components (valve positioner or solenoid valve) and a valve to provide a final element subassembly for a safety Instrumented Function (SIF). The safety function for the actuator and valve and any additional components in the subsystem is to move the valve to the safe position within the specified safety time when the system is tripped.

Environmental Limits:

Temperatures:

High Temperature -20°C to 120°C
Standard -20°C to 80°C
Low Temperature -40°C to 80°C
Extreme Temperature -50°C to 80°C
Extreme Low Temperature -60°C to 80°C

- Never overcome the service pressure fixed in 8 bars.
- Never fill the pneumatic cylinder with another liquid different than clean and dry air. To fill with another fluid first ask to manufacturer.
- Never transport the equipment with an internal pressure different than the atmospheric.
- Never install this equipment in nuclear plants.
- Never manipulate the bolting of the equipment because it can cause damages during the operation of the equipment.

 It is advisable to isolate the equipment from vibration sources to avoid possible stress relief of the fasteners.

Application Limits

The material constructions of an ACTREG Pneumatics actuators are specified in the ACTREG data sheets and in the main literature. It is especially important that the designer of the SIF checks for material compatibility considering on-site chemical contaminants and air supply conditions. If the ACTREG Pneumatic actuators are used outside the application limits or with incompatible materials or environment, the reliability data and predicted SIL capability becomes invalid.

Design Verification

A detailed Failure Modes, Effects and Diagnostics Analysis (FMEDA) report is available from ACTREG for this product. This report details all failure rates and failure modes as well as expected lifetime of the product. The achieved Safety Integrity Level (SIL) of an entire Safety Instrumented Function (SIF) design must be verified by the designer via a calculation of PFDAVG considering the architecture, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failures rates of all equipment included in the SIF. Each subsystem must be checked to assure compliance with minimum Hardware Fault Tolerance (HFT) requirements. When using the ACTREG Pneumatic Actuator in a redundant configuration, a common cause factor of at least 5% should be included in the safety integrity calculations.

The failure rate data listed in the FMEDA report is only valid for the useful lifetime of the ACTREG Pneumatic Actuator. The failure rates will increase after this useful lifetime period has expired. Reliability calculations based on the data listed in the FMEDA report for mission times beyond the lifetime may yield results that are too optimistic, i.e. the calculated SIL will not be achieved.

SIL Capability

ACTREG Pneumatic actuators are suitable for use in a safety instrumented system up to SIL 2. Under consideration of combination of final elements with a hardware fault tolerance HFT=1 the devices may be used in a redundant structure up to SIL 3.

ACTREG Pneumatic actuator should be actuated four times per year in order to accomplish with the safety requirements.

Systematic Integrity

The Actreg Pneumatic actuator has met manufacturer design process requirements of safety integrity level (SIL) 2 Capability (SIL) 3. There are intended to achieve sufficient integrity against systematic errors of design by the manufacturer.

General Requirements

The system and function response time shall be less than the process safety time. The ACTREG Pneumatic Actuator will move to its defined safe state in less than this time with relation to the specific hazard scenario. All SIS components including the ACTREG Pneumatic Actuator must be operational before process start-up. The User shall verify that the ACTREG Pneumatic Actuator is suitable for use in safety applications by confirming the ACTREG Pneumatic Actuator nameplate and model number is properly marked. Personnel performing maintenance and testing on the ACTREG Pneumatic Actuator shall first be assessed as being competent to do so. Results from periodic proof tests and partial valve stroke tests (if any) shall be recorded and periodically reviewed. The ACTREG Pneumatics Actuator shall not be operated beyond the useful lifetime as listed in paragraph 5.3 without undergoing overhaul or replacement.

- When the spring return type actuator with the Jackscrew enters into the auto-operation mode after manual operation, the trapezoid screw must be back out to the proper position.
- When the spring return type actuator with the Jackscrew enters into the auto-operation mode after manual operation, the 2 globe valves on the manual pump must be opened.
- When the double acting type actuator with the gear mechanism enters into the auto-operation mode after manual operation, the hand lever must be set to the auto position.
- Don’t rotate the handwheel and or lever if the manual override is not needed.
- Confirm if the air pressure is normal before operation.
- The operation medium should be filtered dry, clean air.

TESTS

All the pneumatic cylinders of the ACTREG Scotch Yoke actuators are tested according the specifications of the 2014/68/EU.

10. Handling and Storage

All actuators must be examined upon delivery to ensure that they have not suffered any damage during transport. Inform the supplier immediately if there is any damage.

As standard, actuators will leave the factory in closed position. Open position configuration must be specially requested.

 Actuators must be stored under cover and protected from inclement weather conditions and dampness with air conducts properly covered.

Actuators should not be unpacked until their definitive installation, except for inspection purposes.

The handling and transportation of actuators must be carried out with extreme precaution and using the necessary and adequate means depending on their size and weight in order to avoid risks to the operators handling them.

 Check the physical conditions of actuators in order to detect any damage incurred during transport and/or handling. Actuators should be installed in such a way that they are easy to access in order to do the periodic inspections and corresponding maintenance operations necessary to guarantee the performance qualities that they have been designed for.

 Actuators must not support unexpected stress. It is important to do the assemble with a correct alignment and parallelism to guarantee that it is not submitted to unexpected stress.

 **After the installation carry out a final operational check of the actuator by making some opening and closing operations to ensure that it works properly.**
The use of dry air increases the lifetime of the actuators, as well as the lifetime of their accessories, solenoids and other pneumatic accessories.

During operation, a low demand mode SIF must be proof tested. The objective of proof testing is to detect failures within the equipment in the SIF that are not detected by any automatic diagnostics of the system. Of main concern are undetected failures that prevent the SIF from performing its function.

Periodic proof tests shall take place at the frequency (or interval) defined by a SIL verification calculation. The proof tests must be performed more frequently than (or as frequently as) specified in the SIL verification calculation in order to maintain the required safety integrity of the overall SIF. Results from periodic proof tests (a test per year four demand per test) and partial valve stroke tests (if any) shall be recorded and periodically reviewed. For detailed Proof Test information refer to the FMEDA report for the ACTREG Pneumatic Actuator.

Repair and replacement repair procedures outlined in the maintenance and installation instructions must be followed.

11. Maintenance

Air quality required:
For best possible service life and trouble-free operation, ISO 8573-1 quality class 5.4.4 should be used. This means 40µm filter, dew point +3ºC for indoor operation (a lower dew point should be selected for outdoor operation, Quality class 3) and oil concentration 5.0mg oil/m³.

Quality Class	Pollution		Water	Oil
	Particle size (µm)	Max. concentration (mg/m³)	Max. press. dew point (ºC)	Max. concentration (mg/m³)
1	0.1	0.1	-70	0.01
2	1	1	-40	0.1
3	5	5	-20	1.0
4	15	8	+3	5.0
5	40	10	+7	25
6	-	-	+10	-

Lubrication:
Actuators are factory lubricated for the lifetime in normal working conditions and do not require any further lubrication.

PREVENTIVE MAINTENANCE

This basically consists in a periodic inspection to check the actuator function. Actuators must be operated at least once every six months. However, depending on the application of the actuator, this may be done within shorter periods.
It is the end user's responsibility to establish these operation plans depending on the working conditions.

 Never leave the actuators opened or closed during a long period of time.

It is recommended to replace the critical parts of the actuator when an in-depth revision of the installation is made.

MAINTENANCE OPERATIONS

Check the torque of the bolting that assure the tightness of the pneumatic cylinder.

M14 – 133 Nm
M16 – 209 Nm
M20 – 406 Nm
M30 – 1408 Nm
M36 – 2456 Nm

Tightening torque calculated with a Re at 85% and a coefficient of friction of 0.15 (Coefficient of torque performance = 0.2). Material 8.8. Rm = 800 N/mm^2. Re = 640 N/mm^2.

PRECAUTIONS BEFORE DISASSEMBLY!
Disconnect the actuator and its accessories from the air and electrical network.
Disassembly the solenoid from the actuator.
Disassembly the actuator from the valve and/or from its couplings.

Always wear adequate protective clothing (Follow the safety guidelines established by your company!).
Any parts replacement should be done with the original ACTREG spare parts!
The manufacturer will not be responsible of the wrong functioning of the actuator if original ACTREG parts have not been used.

Parts of the actuator will have to be repaired or replaced as soon as there is leakage. As soon as this happens, proceed with the disassembly of the actuator and replacement of all the parts.

12. Remarks

- The equipment has been designed, manufactured and inspected according to the codes: ASME VIII div. I Ed 2010.
- Other directives that apply to this product: ATEX 2014/34/EU and PED 2014/68/EU Module H1.
- Relevant union harmonization legislation: N/A.

Terms and Abbreviations

Describe Basic Terms of Functional safety: What is functional safety, safety function, safe state, fail safe, fail safe, fail dangerous, low demand mode etc.

Typical abbreviations:

- FMEDA: Failure Modes, Effects and Diagnostic Analysis
- HFT: Hardware Fault Tolerance
- PFD_{AVG}: Average Probability of Failure on Demand
- SFF: Safe Failure Fraction, the fraction of the overall failure rate of a device that results in either a safe fault or a diagnosed unsafe fault.
- SIF: Safety Instrumented Function, a set of equipment intended to reduce the risk due to a specific hazard (a safety loop), Safety instrumented control/protection function
- SIL: Safety Integrity Level, discrete level (one out of a possible four) for specifying the safety integrity requirements of the safety functions to be allocated to the E/E/PE safety-related systems where Safety Integrity Level 4 has the highest level of safety integrity and Safety Integrity Level 1 has the lowest.
- SIS: Safety Instrumented System — Implementation system of one or more Safety Instrumented Functions. A SIS is composed of any combination of sensor(s), logic solver(s), and final element(s).
- DC: Diagnostic Coverage Factor (if diagnostic measures exist)
- PTC: Proof Test Coverage Factor
- PFH: Probability of dangerous failure per hour

- PFD: Probability of dangerous failure per demand
- PVST: Partial valve stroke test
- BASIC SAFETY: Freedom from unacceptable risk of harm
- FAIL-SAFE STATE: State where solenoid valve is de-energized and spring is extended.
- FAIL ANNUNCIATION DETECTED: Failure that does not cause a false trip or prevent the safety function but does cause loss of an automatic and is not detected by another diagnostic
- FAIL ANNUNCIATION UNDETECTED: Failure that does not cause a false trip or prevent the safety function but does cause loss of an automatic or false diagnostic indication
- FUNCTIONAL SAFETY: Part of the overall safety relating to the process and the BPCS which depends on the correct functioning of the SIS and other protection layers.
- BPCS: Basic process control system – a system which responds to input signals from the process, its associated equipment, other programmable systems and/or and operator and generates output signals causing the process and its associated equipment to operate in the desired manner but which does not perform any safety instrumented functions with a claimed SIL $\geq$ 1.

Reference Documents

- Special operating Instructions.
- Actuators manufactured by Actreg can be equipped with a variety of Operating mechanisms, such as hand wheel, switch boxes, solenoid valves, relief valves, flow regulators, declutchable gear. This manual just covers the actuator stand alone.
- ACTREG Pneumatic actuator data sheet.
- ACTREG actuator maintenance and installation instructions.

Related Standards

- IEC 61508-2:2010 Functional safety of electrical/electronic/ programmable electronic safety-related systems.
- IEC 60654-1:1993-02, second edition, industrial-process measurement and control equipment-Operation conditions.

For further information visit our website
www.actreg.com

ACTREG
POWER IN AUTOMATION

ACTREG, S.A.U. (Headquarters)
Carrer de l'Energia, 15-25, naves 1-2
Pol. Ind. Barnasud
08850 Gavá
Barcelona (Spain)
Phone +34 936 614 410
actreg@actreg.com

ACTREG do Brasil, Sorocaba (SP)
Avenida Liberdade, 4565
Bairro Iporanga - Sorocaba - SP
CEP 18.087-170
Sao Paulo, Brasil
Phone: 0055 15 3228 1010
actreg@actregdobrasil.com.br

ACTREG UK, LTD
Units 2 & 3 Henson Close
Telford Way Industrial Estate
Kettering Northants NN 16 8PZ
United Kingdom
Phone: 0044 1536412525
sales@actreg.co.uk

ACTREG Shangai Actuator Co. Ltd.
No. 125, Ji Ye Road
SheShan Industrial Zone
Songjiang District, Shanghai, China
P.R.C. 201602
Phone: +86 21 57796818
sale@actreg.net.cn

ACTREG North America
20675 Boul. Industriel
Ste. Anne-de-Bellevue, Québec
H9X 4B2 Canada
Toll Free: 1 800 667 4819
Phone: 001 514 457 5777
trueline.sales@trueline.ca