



**MANUAL
FOR
INSTALLATION
AND
OPERATING**

For gearbox models AB, 242, and 232

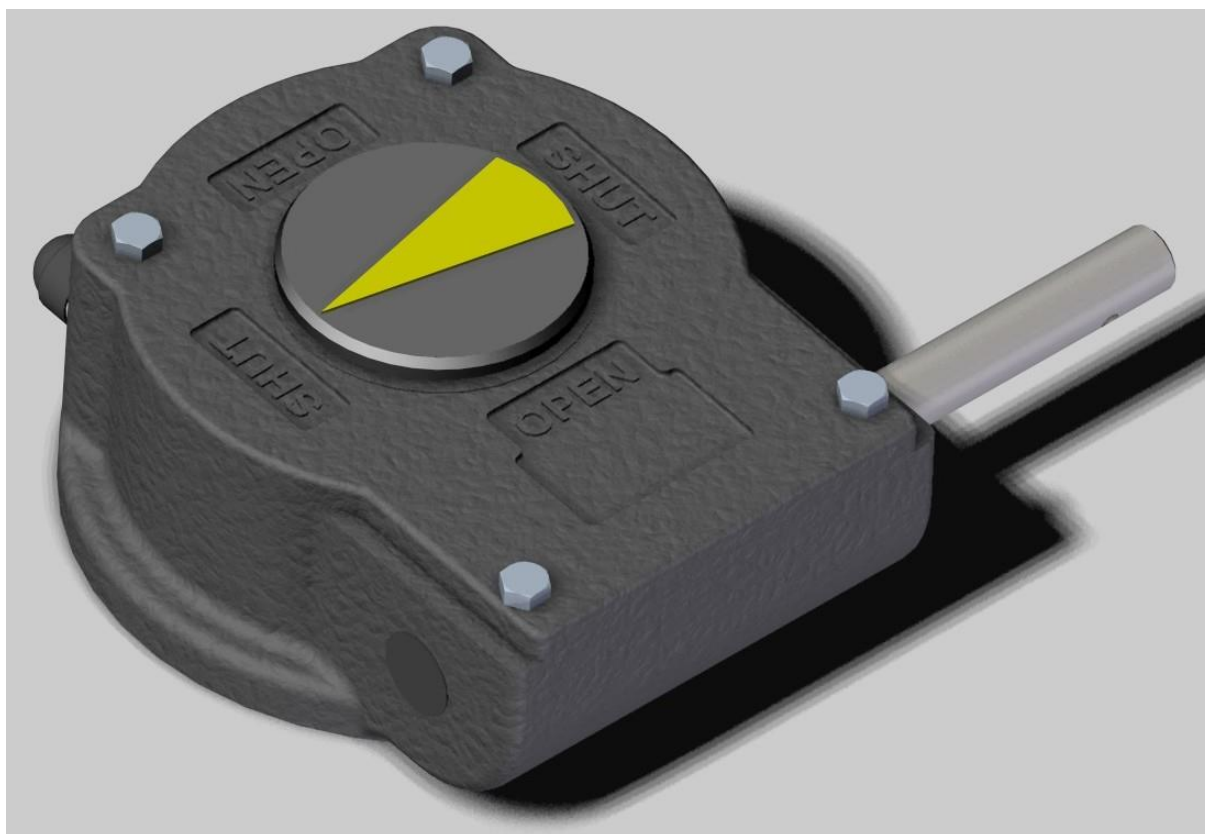


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1 PREFACE

1.1 Introduction

The gearbox of the AB, 232, and 242 series is a quarter turn gearbox designed to use for the manual operation of valves (e.g. butterfly/ball valves) in pipelines.

NB. This manual is valid only for the standard AB, 232 and 242 series gearboxes of Rotork. For special versions, specifications and model can differ. Rotork is not responsible for any damage caused by incorrect use of the gearbox.

2 TECHNICAL DATA SPECIFICATIONS

2.1 Maximum allowable input- and output torque

Gearbox type	Connection Valve ISO 5211/1	Max. Manual operating Torque in [Nm]	
		Input	Output
AB 150	F05-F07	16	150
AB 210(LB)	F05-F07-F10(-F12)	28.5	330
AB 215 (LB)	F05-F07-F10(-F12)	43	500
AB 550 (LB)	F07-F10-F12-F14(-F16)	83	1000
AB 880 (LB)	F10-F12-F14-F16	152	2000
AB 1250 (LB)	F10-F12-F14-F16(-F25)	171	3250
AB 1950(LB)	F12-F14-F16-F25(-F30)	289	5500
AB 1950(LB) HR	F12-F14-F16-F25(-F30)	159	4500
AB 1950(LB)/SP4	F12-F14-F16-F25(-F30)	125	6800
AB 1950(LB)/PR4	F12-F14-F16-F25(-F30)	106	7000
AB2000 (LB)	F12-F14-F16(-F25)	136	4500
AB 3000(LB)	F16-F25(-F30)	305	7000
AB 3000(LB)/PR4	F16-F25(-F30)	111	9000
AB 3000(LB)/PR6	F16-F25(-F30)	104	11000
AB 6800(LB)	F16-F25-F30(-F35)	305	8400
AB 6800(LB)LT/SP4	F16-F25-F30(-F35)	96	9000
AB 6800(LB)/SP4	F16-F25-F30(-F35)	134	12500
AB 6800(LB)/PR4	F16-F25-F30(-F35)	130	12500
AB 6800(LB)/SP6	F16-F25-F30(-F35)	121	17000
AB 6800(LB)/PR6	F16-F25-F30(-F35)	121	17000
AB 6800(LB)/SP9	F16-F25-F30(-F35)	92	17000
A 200/SP9	F25-F30-F35	166	26000
A 200/PR10	F25-F30-F35	124	26000
A 250LT/SP9	F25-F30-F35-F40	116	26000
A 250/SP9	F25-F30-F35-F40	142	32000
A 250/PR10	F25-F30-F35-F40	142	32000
242-10	F05-F07	15	150
242-20	F07-F10-F12	30	300
242-30	F07-F10-F12-F14	65	650
242-40	F10-F12-F14-F16	120	1200
242-50LT	F14-F16-F25	120	1800
	F14-F16-F25	140	2100

232-05O	F05-F07	13	125
232-05N	F05-F07	12,5	125
232-06	F05-F07	25	250
232-07	F05-F07	21	250
232-08	F07-F10	41,7	500
232-10	F07-F10-F12	39	500
232-11	F10-F12	75	900
232-12	F10-F12-F14	100	1000
232-13	F10-F12-F14	83	1000
232-14	F10-F12-F14	125	1500
232-15	*per application	125	1500

Table 1 : Connection data of the gearbox

For more specified information, you can contact our sales department.

3 HANDLING AND SAFETY PRECAUTIONS

Be sure to read and understand this manual before installation and use of our gearboxes. All personnel working with this gearbox must be familiar with the instructions in this manual and observe the instructions given. Safety instructions must be observed to avoid personal injury or property damage.

3.1 Qualification of staff

Assembly, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel authorised by the end user or contractor. Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety. Work performed in explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor is responsible for respect and control of these regulations, standards, and laws.

3.2 Commissioning

Prior to commissioning, it is important to check that all settings are in compliance with the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

3.3 Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the gearbox if it is in perfect condition while observing these instructions.
- Immediately notify Rotork about any faults and damage and allow for corrective measures.
- Observe recognised rules for occupational health and safety. Observe the national regulations.

3.4 Protective measures

The end user or the contractor is responsible for implementing the required protective measures on site, such as enclosures, barriers or personal safety equipment for the staff.

3.5 Maintenance

To ensure reliable gearbox operation, the maintenance instructions included in this manual must be observed. Any gearbox modification requires the consent of the manufacturer. A Rotork gearbox requires only little maintenance. To ensure that the gearbox is always ready to operate, we recommend for gearboxes the following measures. Three (3) months after commissioning and each year:

- Check the bolts on top of the gearbox;
- Check the bolts on the valve flange;
- Perform a test run every six months;
- Check the gearbox for leakage of grease;
- For gearboxes with permanently vibration and exposure above 60°C, checks should be performed at shorter intervals.

3.6 Storage

The gearboxes need to be stored inside in a safe way to avoid accidents. Also avoid storage in areas subjected to high temperature extremes and /or areas subjected to large amounts of humidity and dust. Protect against floor dampness by storage on a shelf or on a wooden pallet. Apply suitable corrosion protection agent to bare surfaces.

3.7 Long-term storage

If the Gearbox must be stored for a long period (more than 6 months) the following points must be observed. Prior to storage:

- Protect uncoated surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.

At an interval of approximately 6 months:

- Check for corrosion. If first signs of corrosion show, apply new corrosion protection.

3.8 Packing

Our products are protected and packed by special packaging for the transport ex works. The packaging consists of environmentally friendly materials which can easily be separated and recycled. We use the following packaging material: wood, cardboard, paper, and PE foil. For the disposal of the packaging material, we recommend recycling and collection centres.

3.9 Handling

Never drop the gearbox or otherwise subject it to strong impact. Standard gearboxes are delivered without eyebolts. On request assembled eyebolts are available for the AB gearboxes these need to be ordered in the preliminary stages of the order. Eyebolts should only be used to lift the gearbox horizontal on the valve. The input shaft or hand wheel cannot be used for lifting the gearbox. Do not lift the gearbox when it is assembled to the valve with eyebolts, input shaft or handwheel.

3.10 IP rating and environmental conditions

The enclosure protection IP65, 67 and 68 only refers to the interior of the gearboxes and not to the stem shaft coupling compartment. (See table. 6 - IP rating)

Suitability for any specific application is not claimed. IP rating is done in accordance to a standard test protocol. It is recommended that users carry out tailor made tests to prove the product is fit for purpose for the specific environmental conditions. For example marine environment, tropical conditions, cold or very hot conditions, chemical sites with acids or salty conditions requires the end user to assess the fit for purpose.

When the product is used in areas with high temperature fluctuations it is recommended to use pressure compensators to prevent pressure differences between the outside environment and the interior of the gearbox.

3.11 Stem shaft water ingress

Water can enter into the coupling compartment along the valve shaft, this would lead to corrosion. Therefore a suitable anticorrosive (or sticky grease) must be applied on the inside bore hole of the gearbox and coupling before mounting. When water ingress protection towards the stem shaft and rotating quadrant in the coverplate is required, aluminium position indicators with NBR O-ring is needed, which should be mentioned during order process. Our G and W gearbox type are suitable. A condition that can occur in some areas is snow on top of the gearbox with melting water on top of the gearbox, in that case the position indicator with O-ring is recommended. For horizontal outdoor installation also a sealed aluminium position indicator is recommended. For gas applications with sealed position indicators an air vent in the indicator could be required. In case of permanent submersion of the gearboxes or for buried service, a protection cover must be fitted instead of a

position indicator and should be mentioned in the order. Exchange of the position indicator for the protection cover is possible.

3.12 Paint

We deliver our gearboxes in different RAL colours, our standard average paint thickness is 60 microns for AB and 242 gearboxes and 40 microns for the 232 gearboxes, suitable for installation in a clean and dry industrial indoor environment. Our process consists of a phosphating pre-treatment followed by our standard DTM (direct to metal) paint system (Polyaspartic) or primer paint. Other paint systems are on customer request. For submersed, marine conditions, use for buried service or exposed to corrosive outside environment and other non-standard environments, paint system are to be advised by the customer including IP rating. On request we can deliver paint systems and thicknesses (*see table 4 standard conditions and options*)

3.13 Primer

On request we deliver gearboxes in primer. Standard primer is a 1K industry primer which has a maximal lifetime of 1, 5 month and must be stored only in indoor, clean and dry conditions. On request zinc primer can be supplied which has a maximal lifetime of 3 months when free from zinc salts and free from contamination and stored in a clean exterior. In industrial or marine conditions this should be reduced to the practical minimum.

3.14 Seals

Rotork is using a silicone low volatile liquid seal between cover lid and body. Loosening the top bolts of the cover plate from the gearbox can break the seal resulting to leakage. Rotork will not be held liable when the top bolts are opened without notification. Once opened a new liquid sealing must be applied. Liquid seals kits may be obtained from Rotork. During the order process it should be mentioned when gearboxes are exposed to high- or low temperatures. Seals made of elastomeric materials are subject to ageing. All NBR seals subject to rotating parts are lubricated with MI-setral 9-M. Gearboxes up to minus 60 degrees Celsius are built with special O-rings and an aluminium indicator will be used to prevent water increase into the bore of the gearbox.

3.15 Grease

Rotork is applying grease that is non-self-igniting and do not present an explosion hazard. Dependent on the environmental conditions different greases can be used such as high temperature grease, silicone free grease, foodgrade grease or oxygen free grease. Gearboxes for minus 60 degrees Celsius are built with 75% filling level of grease. Gearboxes are filled for life but on customer request grease nipples are an option to be mentioned during order process.

3.16 Gearboxes for – 60°C operation

Gearboxes for – 60°C have special O-rings and seals. The AB range has a position indicator with O-ring and have special closed stainless nuts on the stud bolts with a copper ring and an additional O-ring around the input shaft. Gearboxes are filled for life with 75% grease. Up to AB1250 the housing is made of cast iron and tested up to minus 60 degrees Celsius. On request ductile iron is available. For the AB1950 up to the A250 we supply ductile iron housing for – 60°C as standard. On request the gearboxes will be supplied with stainless steel name plate.

3.17 Correct use

Prior to installation, be sure the gearbox will **NOT** be overloaded during normal use. For this, verify that valve size and required opening torque do not exceed the values given for the gearbox. For the maximum allowable torque on the gearbox, (see table 1). AB, 232 and 242 gearboxes can only be used for manual operation.

3.18 Installation and operating

Not observing the rules as stated in this manual, can lead to damage and/or personal injuries. Qualified personnel must be fully aware of the instructions as described in this manual. Only when the instructions are observed, correct operation of the gearboxes can be guaranteed.

3.19 Disposal

Never dispose a gearbox at a general disposal site/depot. The gearbox has to be offered to a disposal depot for recycling. The iron parts can be used for recycling. The seals are of nitrile and can be used for plastic recycling. The grease may not be discharged to sewer- or surface water. It has to be disposed according to local regulations.

3.20 Identification

Each gearbox has a nameplate. On this nameplate you find the following standard information:

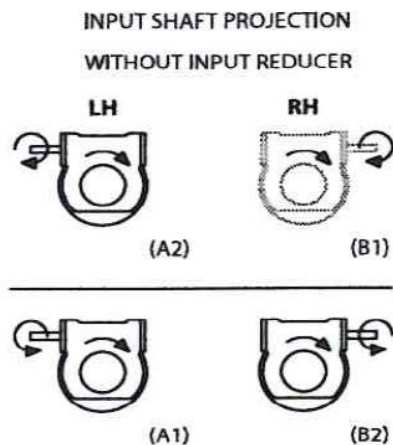
- Model type – Rotork order.no with line.no – Production date and other customer information, when required.

N.B. Information on the name plate is important and is required in case of non-conformities or requests. In case of non-conformity, please send a description of the complaint, details from the nameplate with clear photograph(s) to sales.gearsbv@rotork.com.

3.21 Orientation options of gearboxes.

To determine whether a gearbox is left or right handed, the gearbox is observed from above (top view) with set screws pointing downwards. The shaft is than at the top either pointing to the left (left handed gearbox) or to the right (right handed gearbox).

Standard we deliver our gearboxes in A2 orientation. Other options are available (see Figure 1).



A1 = LH input shaft – anticlockwise in, clockwise out.

A2 = LH input shaft – clockwise in, clockwise

out.
B1 = RH input shaft – clockwise in, clockwise out.

B2 = RH input shaft – Anticlockwise in, Clockwise out.

Figure 1: Orientation of gearboxes

3.22 Keyway and drive positions

Figure 2 shows the different options of key positions. Figure 3 is the top view of our standard left handed gearbox in closed position. Figure 4 shows the different drive options. Special drive requirements on request.

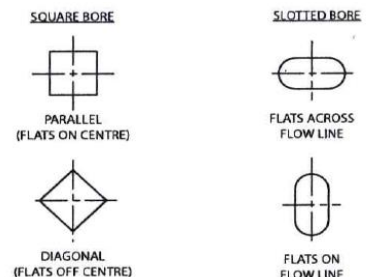
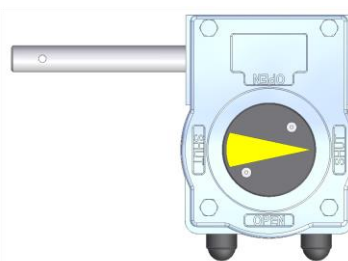
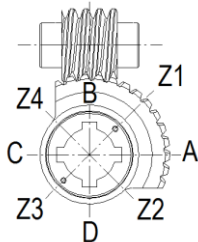


Figure 2: keyway in closed position Top view

Figure 3: AB left handed gearbox top view with setscrews bottom side

Figure 4: drive options

4 INSTALLATION: MOUNTING TO THE VALVE

Following description applies to standard type gearbox.

1. The gearbox is standard delivered in the closed position, setscrews are loosely tightened.
2. It is recommended to mount a hand wheel on the input shaft before assembling the gearbox to the valve (see figure 5).

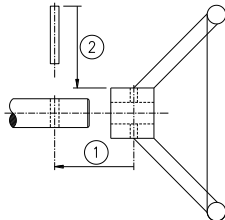


Figure 5: mounting handwheel

3. Check if the bolt circle of the flanges (of gearbox and valve) coincide. Also check if the valve stem and the bore of the gearbox match.
4. Make sure the valve is in the closed position. If not, close the valve before continuing.
5. Check if the gearbox is in fully closed position by turning the handwheel clockwise.
6. When stud bolts are used for fixing the gearbox to the valve, it is recommended to screw them into the bottom flange of the gearbox before mounting the gearbox on top of the valve.
7. The use of a gasket or liquid seal between the flange of the valve and gearbox is recommended to prevent water ingress.
8. Mount the gearbox perpendicular to the valve (see figure 6)
9. Fix the gearbox to the valve appropriate studs and nuts with washers or bolts. Take into account Table 2 for maximum screw dept. For tightening, refer to standard VDI 2230.
10. The assembly is now ready for adjustment.

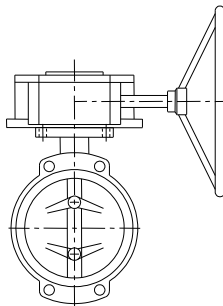


Figure 6: left handed gearbox perpendicular to the valve

4.1 Mounting instructions chainwheel

Following instructions need to be followed for mounting the chainwheel on the shaft. It is advised to use a suitable anticorrosive (or sticky grease) on the inside bore hole of the chainwheel and guide sleeve. When used outside or in a wet or humid environment then we recommended the use of a stainless steel shaft for which we have different classifications to suit several environmental specifications and not a protected or painted C45 steel shaft. Corrosion between the shaft and the chain guide can cause the combination of the chainwheel and the guide to fail. When ordering chain please order 2x the necessary operation distance + full diameter of chainwheel. The chainwheel needs to be sized on the maximum rimpull of 700N. The use of chainwheel is not applicable to the aluminium 232 range. It is not advised to apply more force than the 700N downward force

towards the chainwheel as this gives the risk of damaging the input shaft of the gearbox. For the AB range the smallest gearbox with chainwheel is AB210 and for the 242 range is this 242-30. For the AB150 and 242-10 and 20 chainwheel is not applicable.

1. The gearbox is standard delivered in the closed position, setscrews are loosely tightened.
2. It is recommended to mount the chainwheel on the input shaft before assembling the gearbox to the valve (see figure 7).
3. Mount item 1, 2, 3, 4 and 5 on the input shaft (see figure 7)
4. Locate the holes of the chainwheel and shaft opposite each other, insert item 6 (slotted springtype straightpin) by hammering.
5. Mount item 7b (set screw with cone point) in front of the chainwheel. **Optional** item 7a (hexagon head bolt) can be mounted, this for additional locking of the chain wheel. This extra option need to be ordered in the preliminary stages of the order.
6. Slide item 4, 3, 2 and 1 together and mount item 8 (hexagon head bolt) in tapped hole of item 1 (Axial disc)
7. Mount the chain after you have fixed the gearbox to the valve. Connect the loose ends of the chain with the supplied splitlink (see figure 8)

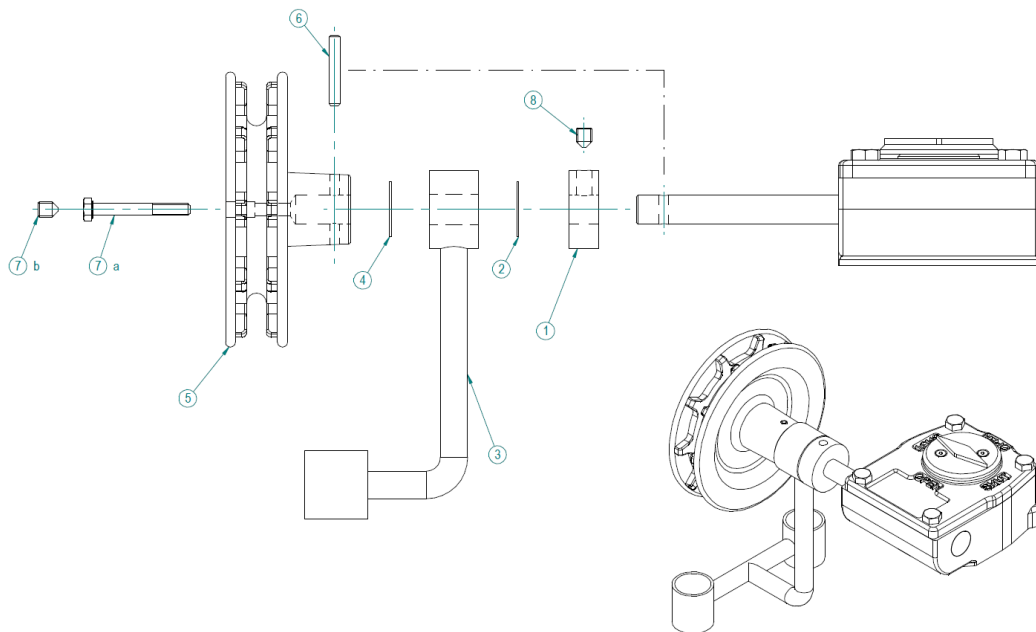


Figure 7: Mounting chainwheel kit



Figure 8: Chain splitlink

PCD	F05	F07		F10	F12	F14	F16	F25	F30	F35	F40
Max. screw depth	8	11		13	14	16	18	18	18	30	36

Maximum screw depth per pitch circle diameter (PCD) for the AB range

PCD	F05	F07	F10	F12	F14	F16	F25
Max. screw depth	6	8	10	12	16	20	16

Maximum screw depth per pitch circle diameter (PCD) for the 242 range

PCD	F05	F07	F10	F12	F14	F16	F25
Max. screw depth	8	11	13	14	16	18	18

Maximum screw depth per pitch circle diameter (PCD) for the 232 range

Table 2. Maximum screw depth

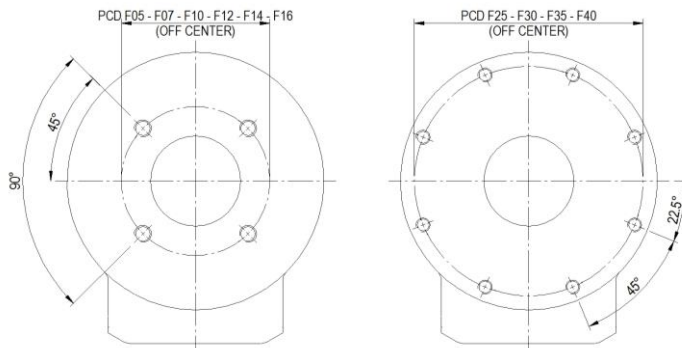


Figure 9: Standard delivery off-center. On request we can deliver on-center with reduced tapping depths and dowel pin holes

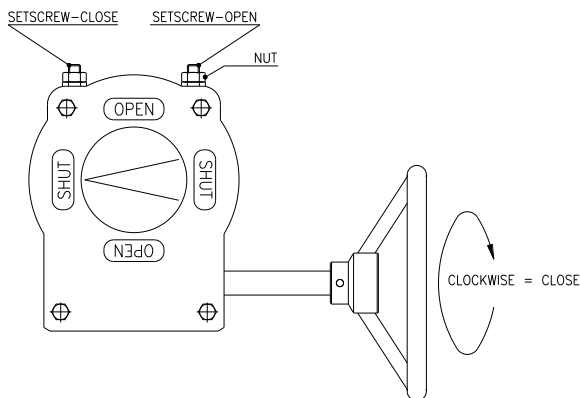


Figure 10: left handed gearbox setscrew adjustment

4.2 Adjustment of set screws

The gearbox is now mounted on top of valve (see installation chapter 4).

1. Close the valve completely, by turning the handwheel clockwise (standard gearbox).
2. The valve position is indicated by the arrow on the position indicator.
3. Remove carefully the plastic caps from the setscrews.
4. When the fully closed position cannot be achieved, loosen the setscrew-close (see figure 10) by turning them counterclockwise. Continue turning the hand wheel until valve is totally closed.
5. Screw the set-screw back into the gearbox (by turning clockwise) until tight (blocked). Secure the setscrew–close with the nut.
6. Open the valve by turning the handwheel counterclockwise.
7. When opening the valve completely (90°) is not possible, loosen the setscrew-open (see figure 3) by turning it counter clockwise. Continue turning the handwheel until the valve is completely opened.
8. Screw the set-screw back into the gearbox (by turning clockwise) until tight (blocked). Secure the setscrew–open with the nut.
9. Close the valve with the handwheel.
10. Put the plastic caps back on the setscrews.
11. Adjustment completed

For the AB, 242 and 232, the set screws contain bonded seals. This is to prevent oil leakage from inside the gearbox when the gearboxes are mounted on the valve with the studbolts pointing downwards. When adjusting the set screws more than once it may result in a loss of the bonded seal and it is advised to apply Loctite Threadlock 242. It is also important to lock the screws properly with a torque according to the table below.

TYPE	SCREW SIZE	TORQUE TIGHTNESS lbs ft	TORQUE TIGHTNESS Nm
SOCKET HEAD	M4	2 - 3	3 - 4
	M5	4 - 6	5 - 8
	M6	7 - 10	9 - 13
	M8	16 - 24	21 - 32
	M10	32 - 47	42 - 63
	M12	55 - 82	74 - 110
	M16	136 - 204	182 - 247
	M20	266 - 400	357 - 535
HEXAGON HEAD	M6	4 - 6	5 - 8
	M8	10 - 15	13 - 20
	M10	19 - 29	26 - 39
	M12	34 - 51	46 - 68
	M16	84 - 126	113 - 169
	M20	170 - 255	231 - 364
	M24	294 - 441	399 - 598
DURLOK	M8	30 - 45	40 - 60
	M10	57 - 86	77 - 115

	M12	101 - 151	135 - 203
	M16	246 - 370	330 - 496
	M20	476 - 713	638 - 956
SOCKET CAP w / NORDLOCK WASHER	M8	18 - 27	24 - 36
	M10	35 - 52	47 - 71
	M12	60 - 91	82 - 124
	M16	148 - 221	200 - 300
	M20	289 - 434	392 - 588
	M24	502 - 752	680 - 1020

Table 3: Tighten force in Nm

4.3 Operating instruction

The AB and 242 models are manually operated quarter turn gearboxes made of cast iron. The 232 models are made of aluminium. All mentioned gearboxes can only be used for manual operating.

The maximum allowable input- and output torques are listed in (table 1).

1. The gearbox is manually operated by handwheel.
2. For opening the valve, the handwheel is turned counterclockwise. For closing turn the handwheel clockwise¹.
3. Stop turning when the required valve position is achieved. The number of turns needed to completely open or close the valve is stated in table 3. (Changed to table 3)
4. The valve position is indicated by the position indicator on top of the gearbox. In case of buried service remote position indicators can be used.
5. When the valve cannot be completely opened (or closed), first detect and solve the cause of malfunction.
6. In case of malfunction of the gearbox ask directly assistance from Rotork and explain the malfunction of the complaint with details from the nameplate with clear photograph(s). Send your mail to sales.gearsbv@rotork.com.
7. When it is decided to do the repair in house, all replacement parts must be obtained from Rotork to assure proper operation of the gearbox.
8. The gearbox is self-braking. Therefore no fixation needs to be installed to retain the valve position².
9. Turn the handwheel until blocked to open or closed position.
10. The system is ready for us.

¹ As special we can deliver clockwise = opening, counter clockwise=closing.

² Option is the possibility to fix the inputshaft to prevent (not allowed) turning.

4.4 Number of turns opening or closing

Model	Number of turns
AB Range	
AB 150	10
AB 210/215	9,25
AB 550	8,5
AB 880	9,5
AB 1250	13,75
AB 1950(LB)	13
AB 1950(LB) HR	21
AB 1950(LB)/SP4	52
AB 1950(LB)/PR4	54,25
AB2000 (LB)	27,25
AB3000 (LB)	14,5
AB3000 PR4 (LB)	60,75
AB3000 PR6	87
AB 6800(LB)	19,5
AB 6800(LB)LT/SP4	79
AB 6800(LB)/PR4	81,5
AB 6800(LB)/SP6	117
AB 6800(LB)/PR6	162,56
AB 6800(LB)/SP9	160,25
A 200/SP9	148
A200/PR10	182,25
AB 250LT/SP9	176
AB 250LT/PR10	182,25
AB 250/SP9	176
AB 250/PR10	182,25
242 Range	
242-10	10
242-20	10
242-30	10
242-40	10
242-50LT	15
242-50	15
232 Range	
232-05	10
232-06	10
232-07	9,25
232-08	9,25
232-10	11,25
232-11	11,25
232-12	10
232-13	10
232-14	10
232-15	10

Table 4 . Number of turns for complete opening /closing

4.5 Handwheel type

Size in mm	Handwheel Type - weight Kgs (lbs)				
	CD (casted)	PS (pressed steel)	SG (Steel welded)	S (Stainless steel)	F (Steel welded)
50	0.11 (0.24)	-	-	-	-
75	0.21 (0.46)	-	-	-	-
100	0.32 (0.71)	0.15 (0.33)	-	-	-
125	0.54 (1.19)	0.2 (0.44)	-	-	-
150	-	-	1 (2.20)	0.4 (0.88)	-
160	-	0.35 (0.77)	-	-	-
200	1 (2.20)	0.75 (1.65)	1.35 (2.98)	1 (2.20)	1 (2.20)
250	-	1.5 (3.31)	1.4 (3.09)	-	-
300	-	-	1.8 (3.97)	-	1.5 (3.31)
315	-	2 (4.41)	-	-	-
350	-	-	2.3 (5.07)	1.5 (3.31)	-
400	-	3.5 (7.72)	2.8 (6.17)	-	2.2 (4.85)
450	-	-	3 (6.61)	-	-
500	-	-	3.5 (7.72)	-	3 (6.61)
600	-	-	4.5 (9.92)	-	3.2 (7.05)
700	-	-	5 (11.02)	-	5.5 (12.13)
800	-	-	5.5 (12.13)	-	6.6 (14.55)
900	-	-	6 (13.23)	-	7.2 (15.87)

Table 5. Handwheel type – weight Kgs (lbs)

STANDARD CONDITIONS

Conditions	
Enclosure protection (See table 4: IP rating)	<p>Standard: 232 range IP65 Standard: 242 range IP67</p> <p>Option: AB range N type IP67 Option: AB range G type IP68 Option: AB range W type IP68-1 (tested 1mtr under water, 72 hours) Option: AB range CS type IP68-10 (tested 10 meter under clean water continuously) Option: Special requirements on request</p>
Paint protection	<p>Standard:</p> <ul style="list-style-type: none"> • AB range 60 microns. Suitable for installation in clean and dry industrial indoor units. • 232 range 40 microns. Suitable for installation in clean and dry industrial indoor units. • 242 range 60 microns. Suitable for installation in clean and dry industrial indoor units <p>Options:</p> <ul style="list-style-type: none"> • 120 microns. Suitable for installation in industrial outdoor units water, gas or power plants with a low pollutant concentration • Higher thickness on request. Suitable for installation in occasionally or permanently outdoor atmosphere with a moderate pollutant concentration (e.g. in waste water treatment plants, chemical/oil/gas industry) • Other paint systems on request
Pre treatment	<p>Standard: Chemical treatment (phosphating) Option: Sandblasting SA 2.5 Option: Other pre-treatments on request</p>
Paint Paint Primer Zinc primer	<p>Standard: QD polyaspartic direct to metal paint Options: Epoxy coat, other paint systems on request</p> <p>Standard: 1K industry primer (maximum lifetime 1,5 month stored only in indoor, clean and dry conditions)</p> <p>Options: Zinc primer (maximum lifetime 3 months when free from zinc salts and free from contamination and stored in clean exterior conditions. In industrial or marine conditions this interval should be reduced to the practical minimum.</p>
Colour Paint thickness Paint thickness Paint thickness Paint thickness	<p>Standard: different RAL colours on request</p> <p>Standard: 40 microns 232 serie (Gloss paint)</p> <p>Standard: 60 microns AB and 242 serie (QD polyaspartic)</p> <p>Options: 120 microns higher thickness on request (Epoxy coat or QD polyaspartic)</p> <p>Standard: 40 microns (1K industry primer) Options: 40 – 60 microns (zinc primer)</p>
Grease Ambient temperature	<p>Standard: Renolit CLX 2 grease</p> <p>Standard: – 20°C to + 120°C Options: – 40°C to + 120°C Options: – 60°C to + 120°C Options: Other types of grease (low temperature, food, silicone free or high temperature) on request</p>

Set screws cover	<p>Standard: Plastic nutcaps with dubo ring (N type)</p> <p>Option: W-nuts with dubo ring (W gearbox type)</p> <p>Option: W-nuts with washer for – 60°C specification</p> <p>Option: W-nuts with cupper ring (G and CS gearbox type)</p>
Position indicator	<p>Standard: Plastic indicator with zinc plated bolt screws (N type)</p> <p>Option: Aluminium indicators without NBR O-rings (N gearbox type)</p> <p>Option: Aluminium indicators with NBR O-rings (protected for water ingress at stem shaft) (G, W, gearbox type)</p> <p>Option: Aluminium or GG25 indicators with Special O-rings for – 60°C specification.</p> <p>Option: Buried surface and special requirements on request</p>
Shafts	<p>Standard: Carbon steel shafts (N type gearbox)</p> <p>Option: Stainless steel shaft different classifications (G, W and CS type gearbox)</p> <p>Option: Shaft extensions on request</p>
Handwheels	<p>Standard: Pressed steel RAL9005</p> <p>Standard: Steel welded RAL9005</p> <p>Standard: For 242 gearboxes Casted handwheel RAL9005</p> <p>Option: For 242 Pressed steel or steel welded RAL9005</p> <p>Option: Stainless steel handwheels</p> <p>Option: Chainwheel (kit) with zinc plated-, steel zinc plated- or stainless steel chain.</p> <p>Note: When ordering chain please order 2x the necessary operation distance + full diameter of chainwheel.</p>
Padlock system	<p>Option: Stainless steel chainwheel on request.</p>

Table 6: Standard conditions and options

5 IP RATING

5.1 Solid Particle protection

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid foreign objects.

Level	Object size protected against	Effective against
6	Dust tight	No ingress of dust; complete protection against contact

5.2 Liquid ingress protection

The second digit indicates the level of protection that the enclosure provides against harmful ingress of water.

Level	Protected against	Testing for	Details
5	Water jets	Water projected by a nozzle (6.3 mm) against enclosure from any direction shall have no harmful effects.	Test duration: at least 3 minutes Water volume: 12.5 litres per minute Pressure: 30 kPa at distance of 3 m
6	Powerful water jets	Water projected in powerful jets (12.5 mm nozzle) against the enclosure from any direction shall have no harmful effects.	Test duration: at least 3 minutes. Water volume: 100 litres per minute. Pressure: 100 kPa at distance of 3m.
7	Immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).	Test duration: 30 minutes Immersion at depth of at least 1 m measured at bottom of device, and at least 15 cm measured at top of device
8	Immersion beyond 1 m	The equipment is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer. Normally, this will mean that the equipment is hermetically sealed. However, with certain types of equipment, it can mean that water can enter but only in such a manner that it produces no harmful effects.	Test duration: continuous immersion in water Depth specified

Table 7. IP rating

6 CERTIFICATES

6.1 Atex

Directive EC 94/9/EG states the directive only applies to equipment which is capable of causing an explosion through its own potential sources of ignition. The gearboxes from type AB, 242, 232, ILG/S and ILG/D don't have their own potential source of ignition, so directive EC 94/9/EG doesn't apply. Therefore we state that:

Operation of gearboxes type series AB and 232 with the marking:



II 2 G D c 120 C

in areas with explosive gas atmospheres Zone I and II Category 2 (and 3)
and explosive dust atmospheres Zone 21 and 22 Categories 2 (and 3)



- εx** : this product meets the requirements for explosion prevention
- II** : in a potential explosive surrounding, other than in mines,
- 2** : with a high level of safety, based on normal operation and anticipated risks
- G D** : suitable for a possible explosive atmosphere caused by gases, vapours, mists of air/dust mixtures
- c** : safety obtained by constructive solutions.
- 120C** : indicating the maximum surface temperature in °C

6.2 Certificates of conformity

Rotork certify that the Gearbox models AB, 242 and 232 supplied conforms in all respects to our specifications and have been subject to our Quality System conforming to BS EN ISO9001:2008

6.3 Other certificates

For other certificates please contact our sales department, these are on request and need to be ordered in the preliminary stages. The following certificates we can provide:

- EUR 1 certificate
- Certificate of origin
- GOST certificate
- Certificate of Conformity
- 2.2 certificate
- Long term supplier declaration

6.4 Reach

rotork[®]
Gears

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Dear Customer,

REACH REGULATIONS: ROTORK'S POSITION

Rotork's responsibilities with regard to the REACH regulations are under the user section of the regulations; Rotork are not manufacturers or importers of chemicals or substances however we use substances that will contain chemicals.

Statement:

Rotork use only main stream materials such as aluminium, copper and iron and substances such as oil, grease and brand named products, which are highly likely to be registered under REACH. Our products, including finish coatings, contain no substances listed below.

Substance Name	CAS Number
Anthracene	120-12-7
4,4'- Diaminodiphenylmethane	101-77-9
Dibutyl phthalate	84-74-2
Cyclododecane	294-62-2
Cobalt dichloride	7646-79-9
Diarsenic pentaoxide	1303-28-2
Diarsenic trioxide	1327-53-3
Sodium dichromate, dihydrate	7789-12-0
5-tert-butyl-2,4,6-trinitro-mxylene (musk xylene)	81-15-2
Bis (2-ethyl(hexyl)phthalate) (DEHP)	117-81-7
Hexabromocyclododecane (HBCDD)	25637-99-4
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8
Bis(tributyltin)oxide	56-35-9
Lead hydrogen arsenate	7784-40-9
Triethyl arsenate	15606-95-8
Benzyl butyl phthalate	85-68-7

Rotork do not foresee any loss of supply in any of the materials and substances that we current use in our products.