



AVK BUTTERFLY ACTUATION MANUAL INSTALLATION, OPERATION & MAINTENANCE MANUAL

Instruction for use

Thank you for selecting an AVK product. With correct use, the product is guaranteed to deliver a long and reliable service. This manual has been prepared to assist you with the installation, operation and maintenance of the valve to the maximum efficiency. For ease of reference, it has been divided into sections covering all aspects of use, and it is in the users best interests to read it and ensure that it is fully understood.

Health and Safety

It is always recommended that wherever work is being carried out on a valve that the valve is fully depressurised prior to carrying it out, and for the convenience draining of the line may be beneficial.

It is essential that the user of the valve is aware of the weight of the components and/or assemblies that must be handled and manipulated during installation and maintenance. It is the users responsibility to ensure that safe working practices are followed at all times.

Whenever AVK products are installed, operated, or maintained, it is essential that the staff that undertake these operations be adequately trained. The hazards of pressurised liquids and gases can be severe, and it is the responsibility of the users to ensure that trained, competent staff undertake these duties. This manual has been designed to assist, but it can never fully replace quality training in the workplace. AVK technical staff will always be available to answer any questions relating to specific problems that may not be covered by this manual.

AVK products are designed and manufactured to be fit for purpose, and to a high and reliable standard. This provides a safe product with minimum risk to health when used correctly for the purpose for which it was designed. However, this assumes that the equipment is used and maintained in accordance with the manual, and the user is advised to study this manual, and to make it available to all staff that may need to refer to it.

AVK cannot be held responsible for any incidents arising from incorrect installation, operation or maintenance. The responsibility for this must rest wholly with the user.

AVK BUTTERFLY ACTUATION MANUAL

INSTALLATION, OPERATION & MAINTENANCE MANUAL

AVK Butterfly valves DN200 and larger are fitted with manual gearboxes as Standard.

A number of non standard options can also be fitted these include

- Electric actuation
- Extension stems
- Torque limiters
- Position indicators

The follow drawings display common actuation package arrangements.

- Drawing AT071211-02
- Drawing AT071211-04
- Drawing AT071211-06
- Drawing AT071211-07

NOTE: For order specific actuation packages a Bill Of Materials is attached as an appendix.

A - Fitment of gearbox

- Refer to Rotork Gearbox Installation Manual.

B - Fitment of extension stem and outer housing

- Place female coupling over valve/gearbox input shaft aligning keyways with key.
- Slide outer housing over female coupling and align flange holes.
- Fit and tighten fasteners.

C - Fitment of actuator

- Refer to Rotork Actuation Manual Section 5 & 6.

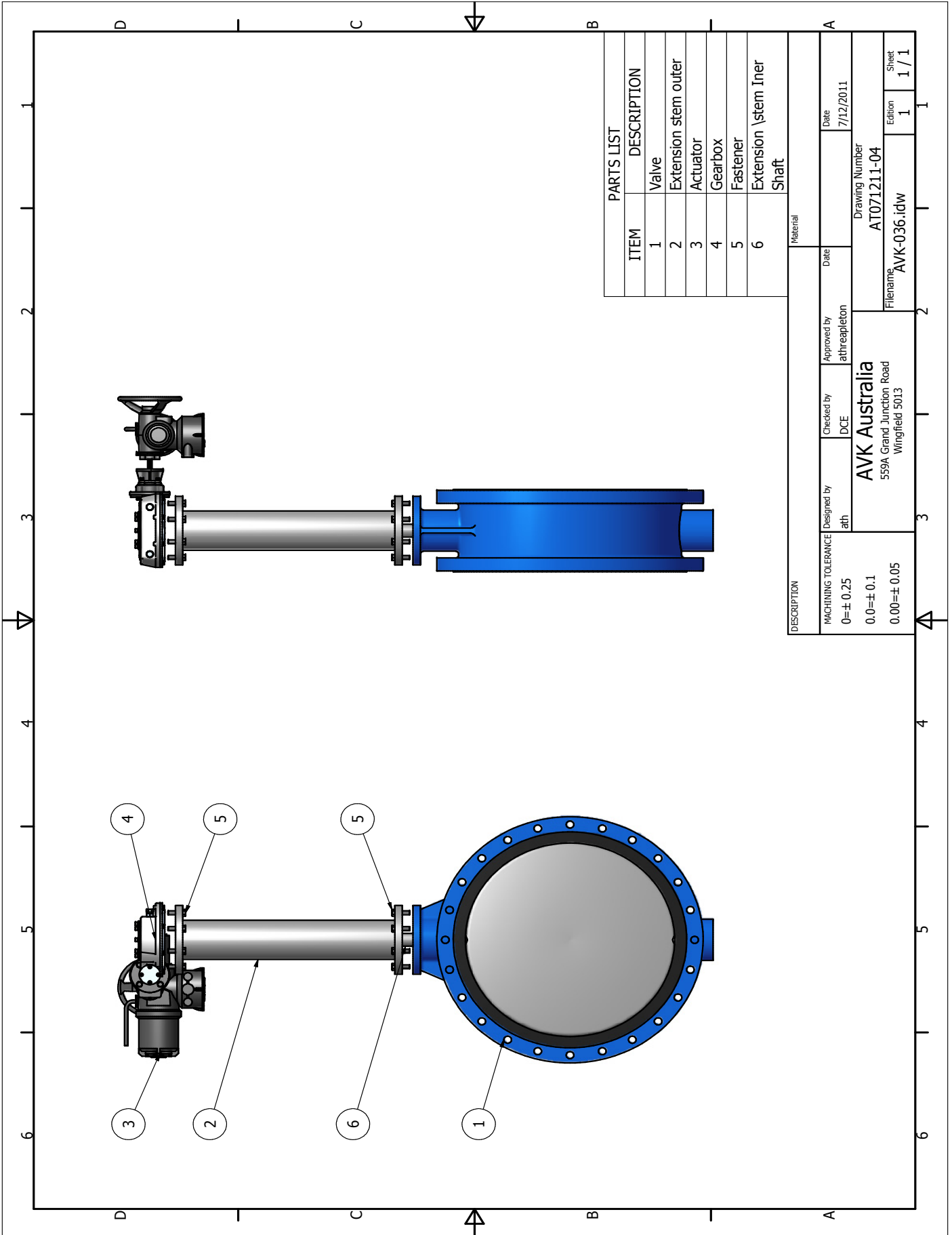
D - Fitment of torque converter housing

- Bolt bottom plate to ISO mount on gearbox or extension stem depending on actuation requirement. Seal with bead of silicon between plate and F10 mount.
- Fit Hercus coupling by placing aligning keyways and sliding into position. Then tighten locking grub screw.
- Adjust Hercus Limiter as per page 5 attachment of Hercus document RG-Install-004 Hercus attachment. Limiter current setting 88nM.
- Place housing barrel over coupling sealing lip with bead of silicon and fitting bolts.
- If position indicator is required fit bottom shaft and key into torque coupling.
- Align mounting holes with housing barrel threaded holes and tighten fasteners. Place bead of silicon on mounting faces prior to fitment.
- Fit handwheel or stem cap to position indicator drive shaft as required.

If no indicator is required

- Fit stub shaft extension place adaptor plate over stub shaft and fix fasteners.
- Place bearing and bearing housing over stub shaft and tighten fasteners.
- Fit handwheel or stem cap to stub shaft as required.

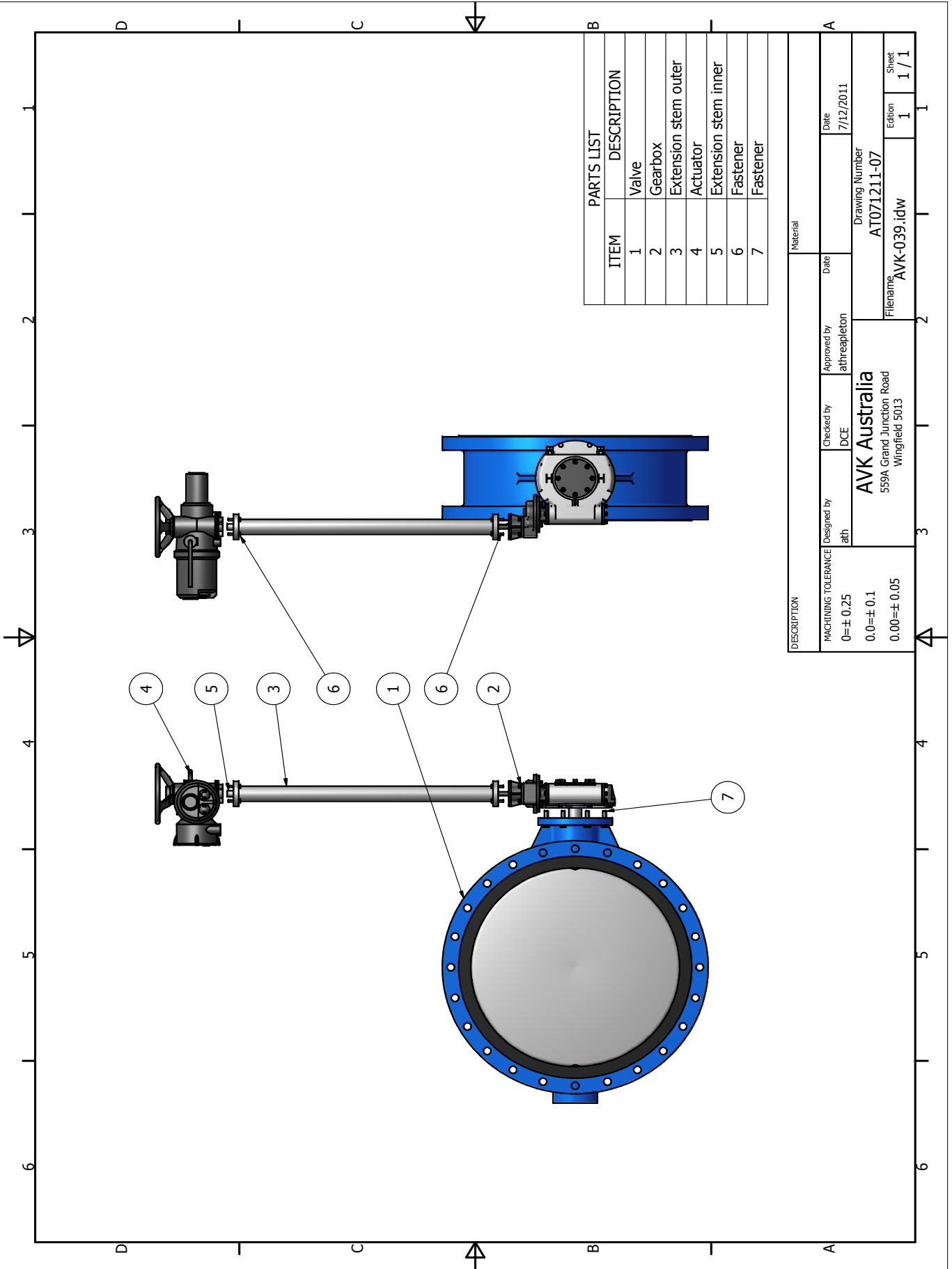
AVK BUTTERFLY ACTUATION MANUAL INSTALLATION, OPERATION & MAINTENANCE MANUAL



ITEM	DESCRIPTION
1	Valve
2	Extension stem outer
3	Actuator
4	Gearbox
5	Fastener
6	Extension \stem Iner
	Shaft

DESCRIPTION		Material	
MACHINING TOLERANCE	Designed by	Checked by	Approved by
0=± 0.25	ath	DCE	athreapleton
0.0=± 0.1			
0.00=± 0.05			
AVK Australia 559A Grand Junction Road Wingfield 5013		Drawing Number	Date
Filename: AVK-036.idw		AT071211-04	7/12/2011
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AVK BUTTERFLY ACTUATION MANUAL INSTALLATION, OPERATION & MAINTENANCE MANUAL

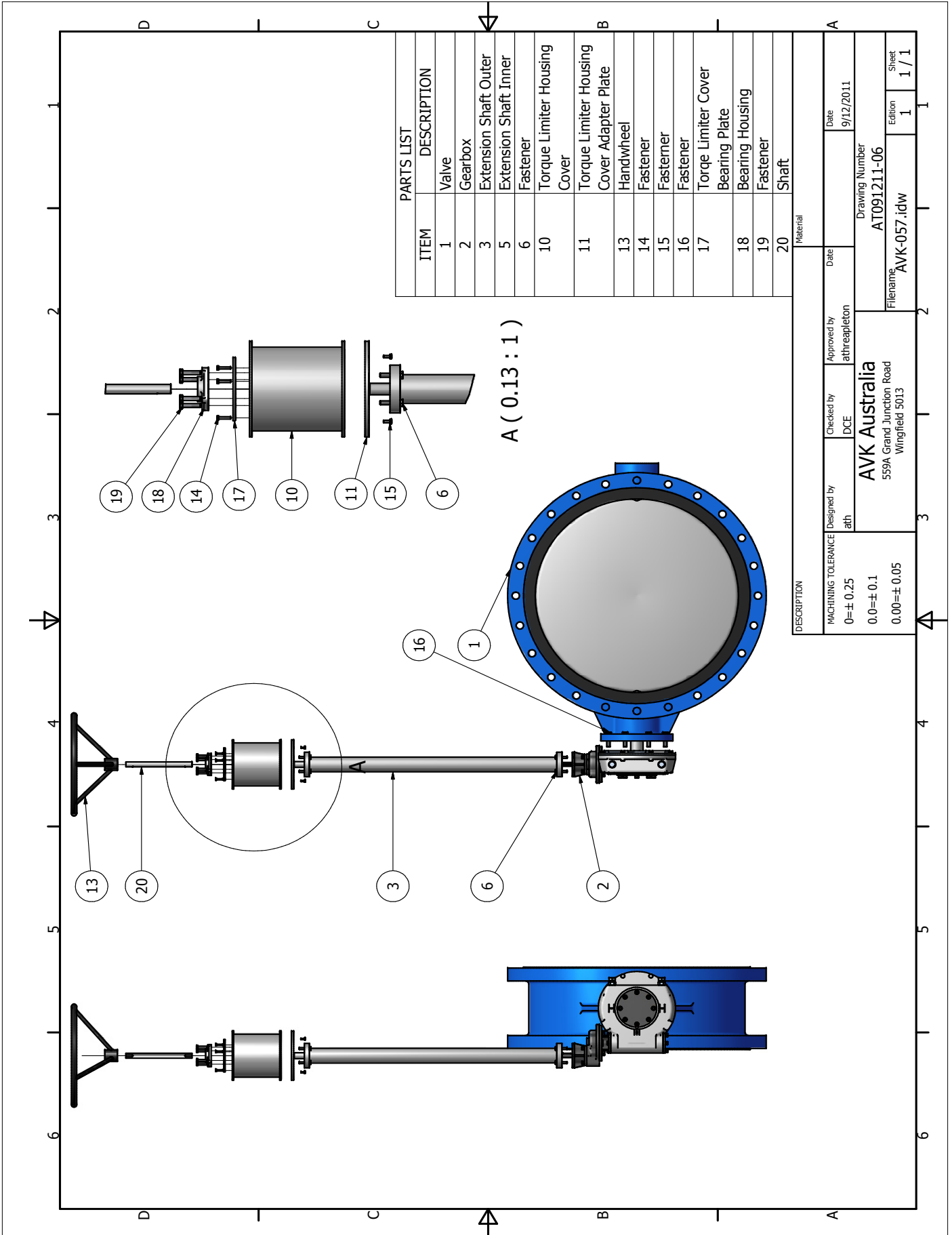


PARTS LIST	
ITEM	DESCRIPTION
1	Valve
2	Gearbox
3	Extension stem outer
4	Actuator
5	Extension stem inner
6	Fastener
7	Fastener

DESCRIPTION		Material	
MACHINING TOLERANCE	Designed by	Checked by	Approved by
0=± 0.25	ath	DCE	athreapleton
0.0=± 0.1	AVK Australia		
0.00=± 0.05	559A Grand Junction Road		
	Wingfield 5013		
	Drawing Number		Date
	AT071211-07		7/12/2011
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AVK BUTTERFLY ACTUATION MANUAL INSTALLATION, OPERATION & MAINTENANCE MANUAL

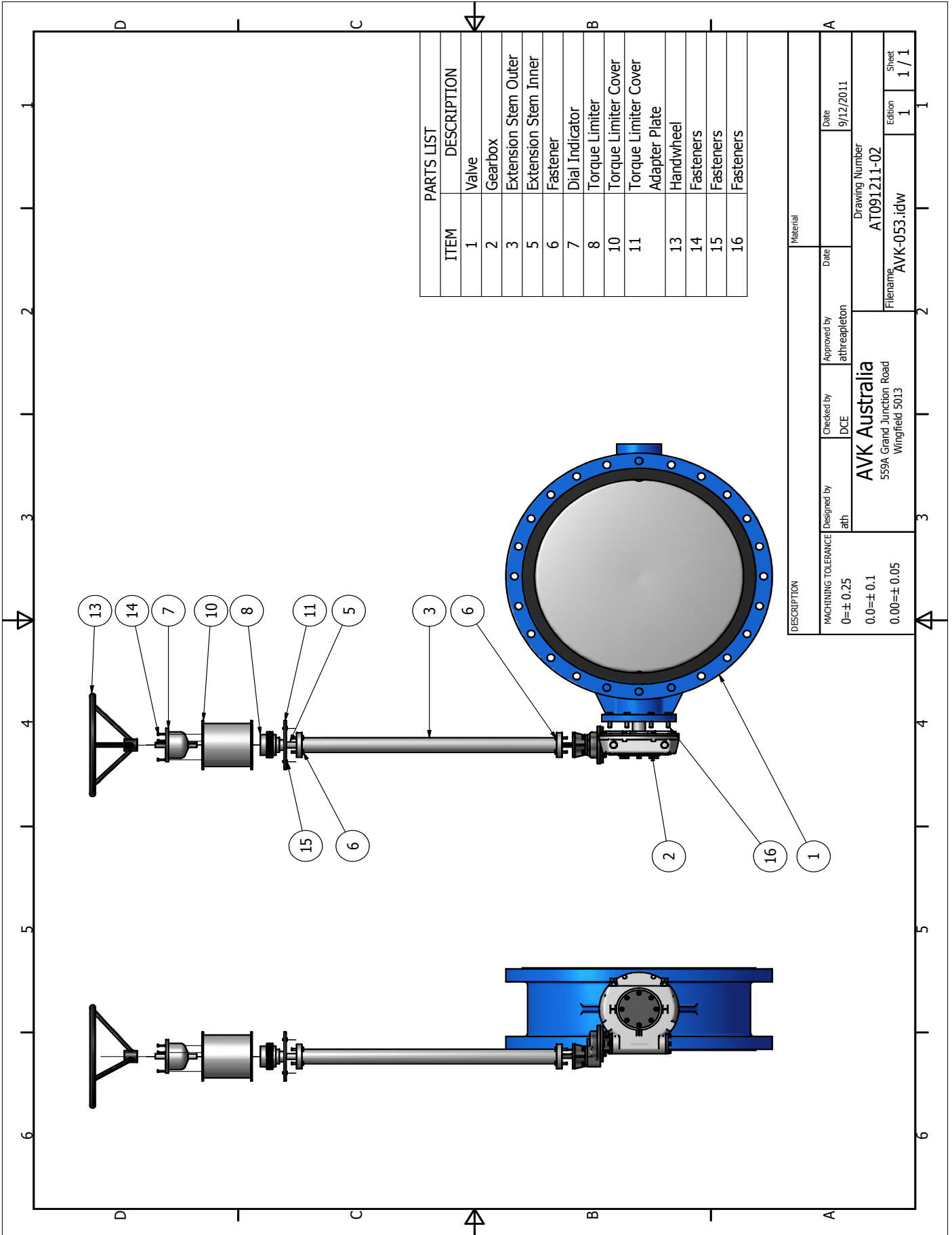


ITEM	DESCRIPTION
1	Valve
2	Gearbox
3	Extension Shaft Outer
5	Extension Shaft Inner
6	Fastener
10	Torque Limiter Housing
	Cover
11	Torque Limiter Housing
	Cover Adapter Plate
13	Handwheel
14	Fastener
15	Fastener
16	Fastener
17	Torque Limiter Cover
	Bearing Plate
18	Bearing Housing
19	Fastener
20	Shaft

DESCRIPTION		Material	
MACHINING TOLERANCE	Designed by	Checked by	Approved by
0=± 0.25	ath	DCE	athreapleton
0.0=± 0.1	AVK Australia		
0.00=± 0.05	559A Grand Junction Road		
	Wingfield 5013		
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AVK BUTTERFLY ACTUATION MANUAL

INSTALLATION, OPERATION & MAINTENANCE MANUAL



ITEM	DESCRIPTION
1	Valve
2	Gearbox
3	Extension Stem Outer
5	Extension Stem Inner
6	Fastener
7	Dial Indicator
8	Torque Limiter
10	Torque Limiter Cover
11	Torque Limiter Cover Adapter Plate
13	Handwheel
14	Fasteners
15	Fasteners
16	Fasteners

DESCRIPTION		Material	
MACHINING TOLERANCE	Designed by	Checked by	Approved by
0=± 0.25	ath	DCE	athreapleton
0.0=± 0.1			
0.00=± 0.05			
			Date
			9/12/2011
			Drawing Number
			AT091211-02
			Filename
			AVK-053.idw
			Edition
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Gearbox Installation Manual

Rotork Gears IW, MOW and MTW ranges

! This manual contains important safety information. Please ensure it is thoroughly read and understood before installing the gearbox.

! This manual is produced to enable a competent person to install the gearbox. Only persons competent by virtue of their training or experience should install, maintain and repair the supplied gearbox.

! The gearbox weight is recorded on the packaging and on a label attached to the gearbox.

! **WARNING** Gearbox may present an unbalanced load.

! **WARNING** With respect to handwheel operation of Rotork gearboxes, under no circumstances should any additional lever device such as a wheel-key or wrench be applied to the handwheel in order to develop more force when closing or opening the valve as this may cause damage to the valve and/or gearbox or may cause the valve to become stuck in the seated/backseated position.

! **WARNING** Damage to protective coatings should be correctly rectified and may invalidate warranty.

Contents

1. Introduction
2. Health and safety
3. Storage
4. Unpacking
5. Handling
6. Installation & maintenance – Worm Combinations
7. Reference

1. Introduction

Unless otherwise specified the gearbox is supplied assembled. In the case of ¼ turn gearboxes, the gearbox stops have been set to a nominal 90° open and close position.

! **The IW gearbox stops must be re-set for the stroke of the valve after combination installation.**

2. Health and safety

This manual is produced to enable a competent user to install, operate, adjust and inspect Rotork gearboxes. Only persons competent by virtue of their training or experience should install, maintain and repair Rotork gearboxes.

Work undertaken must be carried out in accordance with the instructions in this and any other relevant manuals. The user and those persons working on this equipment should be familiar with their responsibilities under any statutory provisions relating to the Health and Safety of their workplace. Due consideration of additional hazards should be taken when using the gearbox with other equipment. Should further information and guidance relating to the safe use of the Rotork products be required, it will be provided on request.

The mechanical installation should be carried out as outlined in this manual and also in accordance with relevant standards such as British Standard Codes of Practice. No inspection or repair should be undertaken unless it conforms to the specific hazardous area certification requirements.

For maintenance of the actuator, refer to the actuator installation and maintenance manual.

! WARNING: Enclosure Materials. The gearbox enclosure may include cast iron, SG iron, carbon steel or stainless steel.

3. Storage

If your gearbox cannot be installed immediately store it in a clean dry place until you are ready to install in situ. Recommended storage temperature range: 0°C to 40°C (32°F – 104°F).

4. Unpacking

Gearboxes are packed in a variety of configurations depending on size, type and quantity of the consignment.

It is the responsibility of the individual unpacking and handling the combination to carry out a risk assessment for the supplied arrangement to ensure safe working. Refer to Section 5 Handling. Packaging material used may include wood, cardboard, polyethylene and steel. Packaging should be recycled according to local regulations.

5. Handling

! Individual weights for gearboxes are recorded on their respective nameplates

! Only trained and experienced personnel should carry out handling. At all times, safe handling must be ensured.

! Each combination must be assessed to identify all risks associated with handling.

! Gearboxes may present an unbalanced load.

! The gearboxes must be fully supported until full valve shaft/stem engagement is achieved and the gearbox is secured to the valve flange.

! Once connected to the valve, each assembly must be assessed on an individual basis for safe handling/lifting. Never lift the complete combination-valve assembly via the gearbox.

! If it is necessary to lift the gearbox using lifting equipment, certified soft slings are recommended. Damage to protective coatings should be correctly rectified and may invalidate warranty.

6. INSTALLATION OF WORM COMBINATIONS

6.1 Output sleeve removal, machining and refitting

Gearbox sizes IW12 to IW16 have an output which will be directly machined as specified with order. All other worm gearbox combinations have a removable output sleeve (1) See Fig. 1. Unless specifically requested at the ordering stage, the output sleeve will be supplied blank and must be machined to suit the valve shaft.

The sleeve can be easily removed from the top of the gearbox by first removing the indicator/cover plate (3) and output sleeve retaining screws (5). These screws are either serrated under their heads or are fitted with serrated washers (4)

! WARNING: Removing retaining screws will result in loss of control of the valve.

O rings (2) are used to seal the indicator plate, output sleeve and retaining screws. Upon final installation on the valve, these screws must be tightened to the correct torque figures as shown on the label on the underside of the indicator or cover plate.

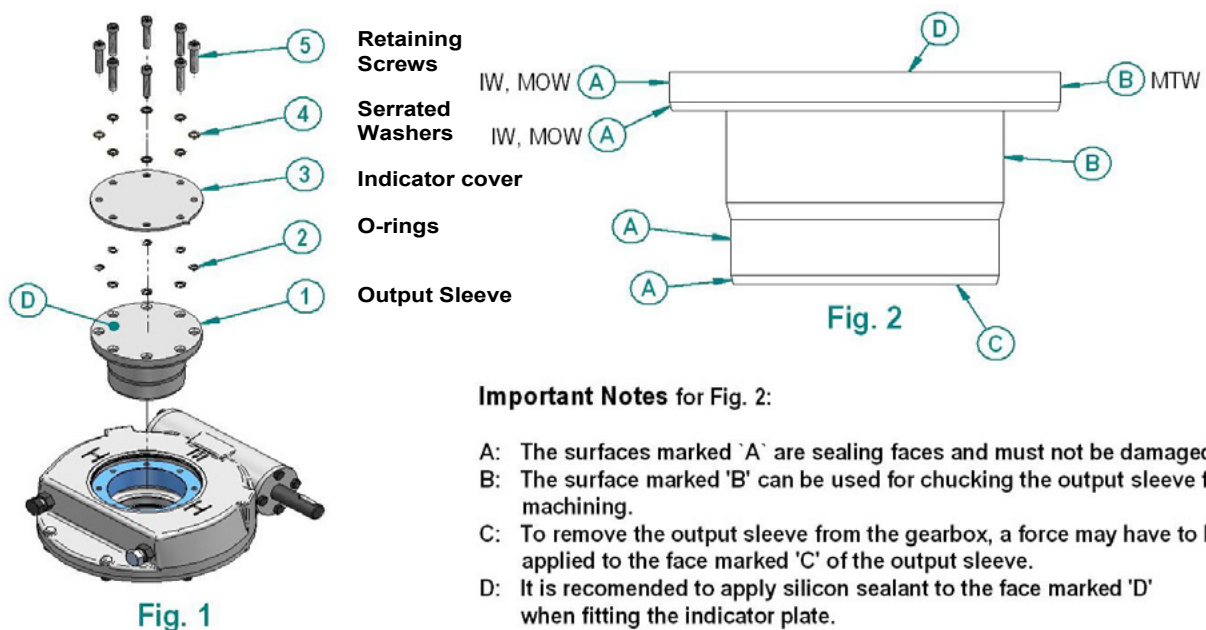


Fig. 1

Fig.1 shows the removal of the output sleeve from the gearbox. See Fig.2 for removing the output sleeve without damaging the sealing faces.

Before refitting the output sleeve after machining, check that the surfaces marked 'A' in Fig.2 are not damaged. Damaged surfaces can break the gearbox seals and cause water ingress or grease leakage. Applying a thin layer of grease to the faces marked 'A' will make refitting of the sleeve easier.

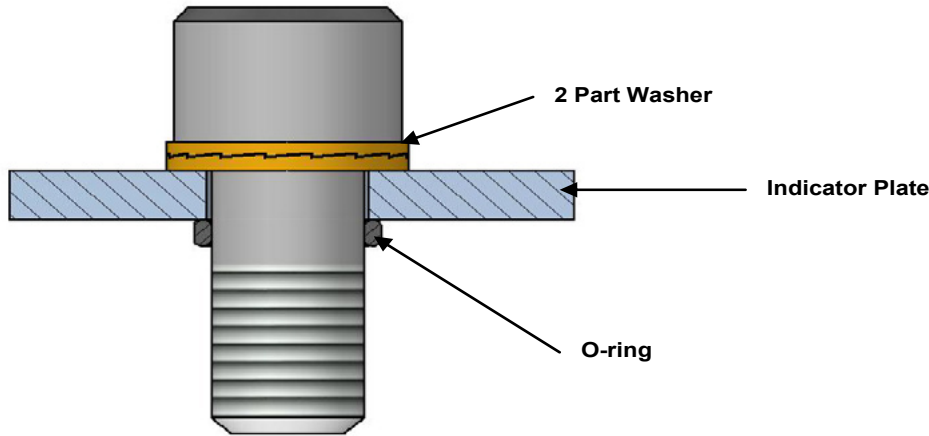
As detailed in Fig. 1 and Fig. 2, it is recommended that silicon sealant is used to seal the indicator/cover plate to the output sleeve by applying sealant to the face marked D. Taking care not to apply sealant to the o rings (2) or the sealing faces of the o rings.

Before re-assembly, clean and de-grease the top face of the output sleeve, underside of the indicator/cover plate, and the socket head cap screws. Make a note of the tightening torque required for the output sleeve screws on the label on the underside of the indicator plate. Insert the screws and washers into the holes in the indicator/cover plate.

AVK BUTTERFLY ACTUATION MANUAL

INSTALLATION, OPERATION & MAINTENANCE MANUAL

It is essential to fit the two part washers the correct way round with the cam faces of the washers joining. Place the o rings over the screw threads and against the indicator plate.



Apply a thin coat of silicon sealant to the top face of the output sleeve. Place the indicator on the output sleeve, with the indicator pointer in the correct orientation if applicable. Engage each screw through the indicator and output sleeve into the tappings in the gear quadrant. Fasten the screws evenly. As the screws start to tighten, press down on the indicator plate to extrude any excess sealant. Wipe away the excess. Tighten each screw to the recommended torque previously noted.

! WARNING It is absolutely essential to assemble and torque tighten the screws immediately after the sealant is applied to the indicator/cover plate and screws. Any delay will allow the sealant to start to cure. This will result in a flexible joint being formed between the output sleeve and indicator/cover plate. This joint would relax over time, allowing the screws to loosen.

6.2 Mounting to the valve

! WARNING - Ensure the valve is fully supported and capable of accepting increased weight and change of centre of gravity resulting from the addition of the gearbox combination.

If the gearbox has been supplied with a handwheel, it is recommended that this be fitted to the gearbox before mounting onto the valve. This will make it easier to rotate the gearing to pick up on the valve stem, either key, flats or square.

- 1) Ensure gearbox output is in the same relative position as the valve shaft (open or closed). Gearbox output position can be moved by rotating the input shaft or turning the actuator handwheel.

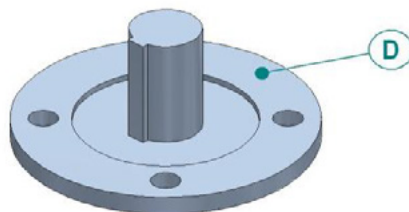


Fig. 3. Valve Mounting Flange

Important Note for Fig. 3:

D: It is recommended that flanges be sealed on assembly with silicon sealant. The face marked 'D' on Fig 3 shows where sealant can be applied to the valve mounting flange.

- 2) Align gearbox baseplate flange square and parallel to valve flange. As shown in Fig. 3, It is recommended that flanges be sealed on assembly with silicon sealant. Grease the output sleeve and the valve shaft.
- 3) Engage gearbox output sleeve on to valve shaft ensuring valve shaft keyway, square etc is in alignment (if necessary rotate output sleeve– refer to 1)
- 4) It is essential that the gearbox baseplate is flush with the valve bonnet flange before the mounting screws are tightened. Mounting screws or studs/nuts must be high tensile steel (grade 8.8 or higher). Firmly tighten down fixings onto the valve flange to the torque required. See Table B on page 9.

6.3 Setting the gearbox stops to suit the valve (IW and MOW Only)

This procedure should be carried out by the valvemaker/supplier and should be done when the valve opening and closing operations can be visibly checked. Once installed within the pipe the stops should not be altered without the authorisation of the valvemaker/supplier.

The gearbox stops are factory set but require adjusting for optimum valve performance.

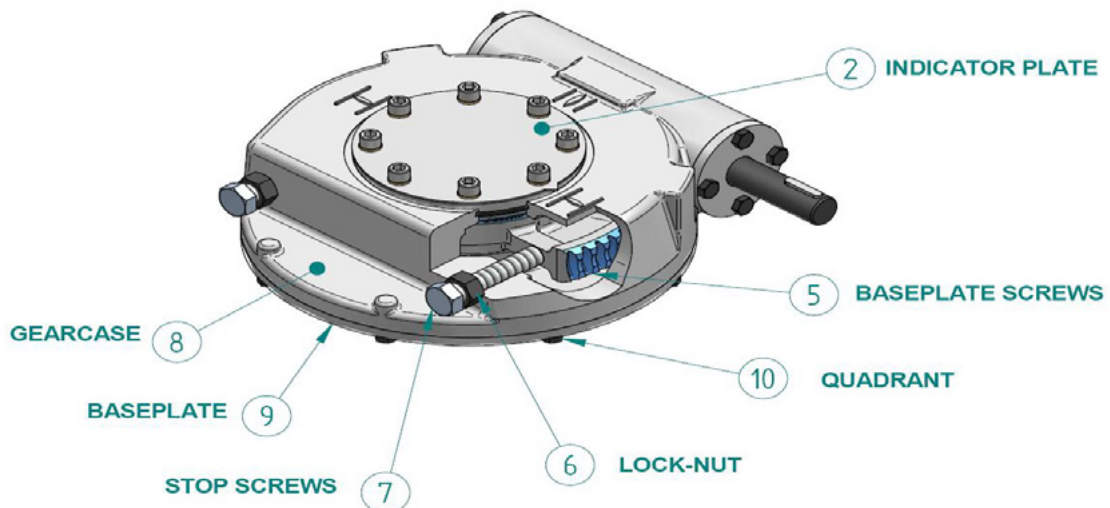


Fig. 4 Setting stop bolts

If an actuator is to be used to operate the gearbox then the actuator limit and torque switch settings should be set up according to the actuator manufacturer's recommendations. The gearbox open and closed stop screws should then be set. See Fig. 4. Close the valve, using the actuator where applicable. Use the indicator plate (2) pointer as an indication of position. Loosen the lock nuts (6) and wind the gearbox closed position stop screw (7) into the gearbox quadrant (5). Back the screw off one turn, then tighten the lock-nut (6) to secure the stop screw. Open the valve with the actuator, and then repeat the process with the open position stop screw.

Note – movement between baseplate (9) and gearcase (8) can occur when operating at near rated torques. It is recommended that regular maintenance occurs to verify baseplate screws (10) are correctly torqued.

AVK BUTTERFLY ACTUATION MANUAL INSTALLATION, OPERATION & MAINTENANCE MANUAL

6.4 Worm combination maintenance

Under normal operating conditions, no maintenance is required for the gearbox. Should the valve be taken out of service for overhaul, the gearbox baseplate may be removed and the lubricant changed using one of the following greases. The baseplate must be sealed using silicone sealant on re-assembly, unless fitted with o-rings. All o rings should be renewed.

IW RANGE

Manufacturer

Fuchs

Name

Renolit CL-X2

Temperature Range

-60°C to +120°C

MOW RANGE

Manufacturer

Fuchs

Name

Renolit LST 0

Temperature Range

-20°C to +120°C

MTW RANGE

Manufacturer

Fuchs

Name

Renolit EPLITH 00

Temperature Range

-10°C to +120°C

An equivalent extreme pressure lubricant may be used.
For extreme temperature applications, please consult Rotork Gears

7. REFERENCE

Table B. Recommended tightening torques for mounting the gearbox to the valve:

Gearbox to valve fixing must conform to Material Specification ISO Class 8.8, yield strength 628N/mm² to use Table B below.

Imperial Size (Hex)	Torque		Metric Size (Hex)	Torque	
	Nm	lbs/ft		Nm	lbs/ft
3/8"	34	25	M5	5	4
7/16"	55	40	M6	9	6
1/2"	83	61	M8	21	15
9/16"	120	89	M10	41	30
5/8"	166	122	M12	71	53
3/4"	291	215	M16	177	131
7/8"	469	346	M20	346	255
1"	702	518	M24	598	441
1 1/4"	1403	1035	M30	1189	877
1 1/2"	2441	1800	M36	2079	1533

TABLE B.

AVK BUTTERFLY ACTUATION MANUAL INSTALLATION, OPERATION & MAINTENANCE MANUAL

TORQUE SETTING



Torque setting of the Torque Limiter is achieved by tightening or loosening the adjustment bolts and/or the adjustment nuts. For torque adjustment of TL200 to TL350, an adjustment nut is provided, and for TL500 to TL240 adjustment bolts are provided. The torque setting can be made after mounting the Torque Limiter on the shaft. The procedure is:

For TL200 to TL350

First, rotate the adjustment nut tightly by hand so that the disc spring fits the plate.

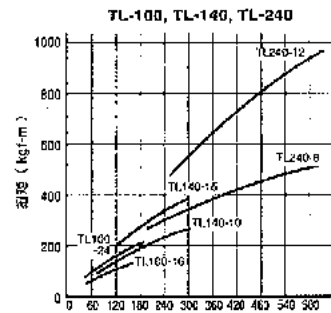
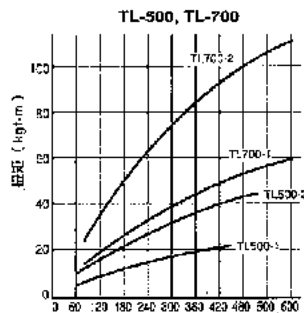
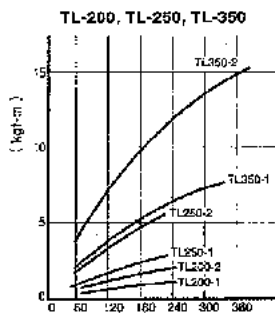
Then tentatively tighten the nut by about 60 degrees with a wrench.

For TL500 to TL240

First, rotate the nut for fixing the disc spring to the plate, and then tighten each adjustment bolt by about 60 degrees.

Then, if the Torque Limiter slips under normal loading conditions, tighten the nut (for TL200 to TL350) or the bolts (for TL500 to TL240) gradually until the torque limiter stops slipping. Always tighten (or loosen) the bolts equally. Try this adjustment several times to find the proper torque setting for the machine. For your guidance, the chart on the next page shows the relation between the effective rotated angle and preset torque.

For precise torque setting, run-in of the torque limiter is recommended; for example, 500 revolutions at 50 to 60r/min with a rotated angle of 45 degrees of adjustment nuts or the bolts.



ROTATED ANGLE AND SETTING TORQUE

