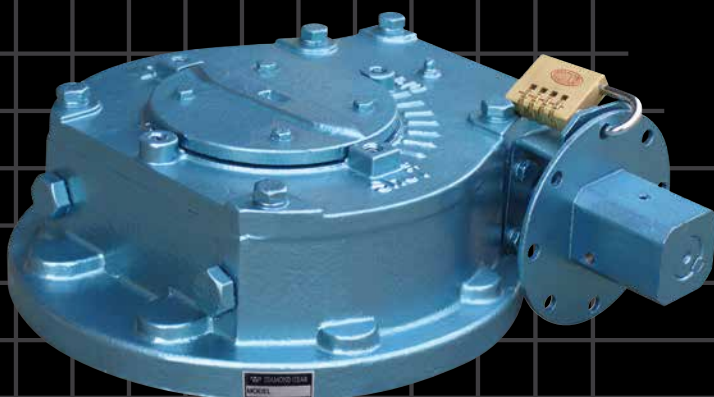
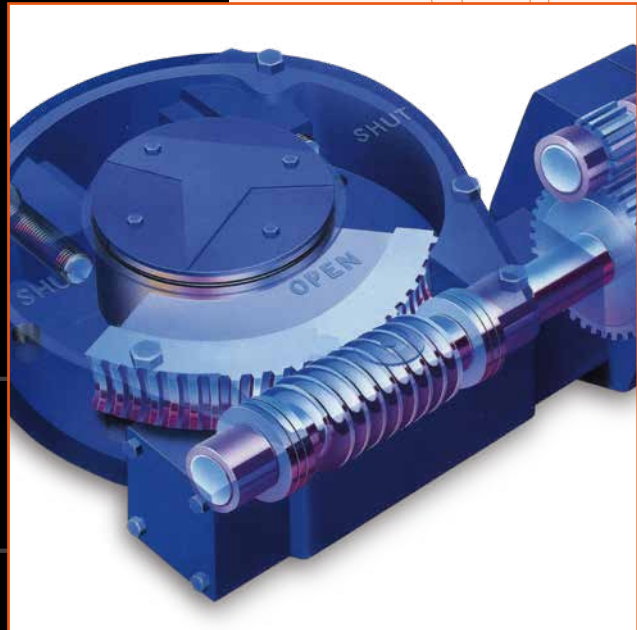
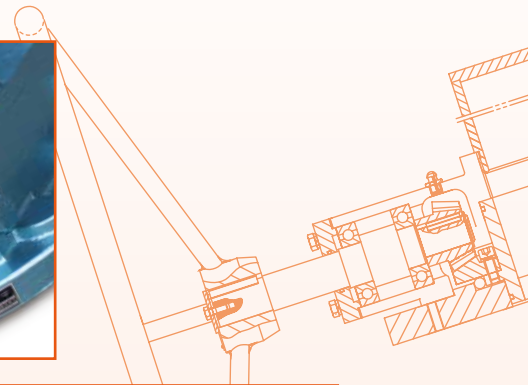




## WORM GEARBOX QUARTER TURN SERIES WG



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**COMPLETE PRODUCT LINE**

*“Australian Pipeline Valve produces isolation, control and flow reversal protection products for severe and critical service media in utility, steam, pipelines, oil & gas and process industries. APV valves and pipeline products form the most competitive portfolio in the market.”*



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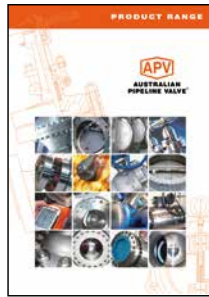
**TORQTURN®**

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**AUSTRALIAN PIPELINE VALVE BRAND RANGE - CATALOGUES**



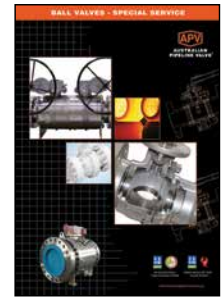
**Product Brochure**



**Ball Valves Floating & Trunnion Mounted**



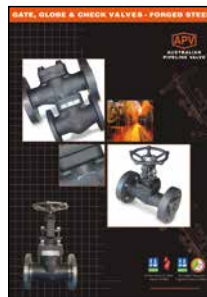
**Ball Valves Floating Small Bore**



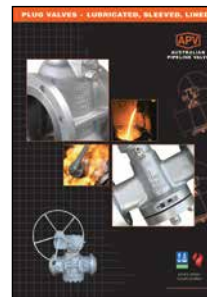
**Ball Valves Special Service**



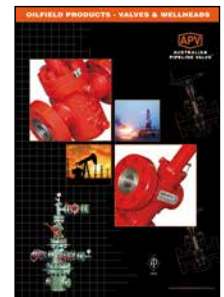
**Gate, Globe & Check Valves - Cast Steel**



**Gate, Globe & Check Valves - Forged Steel**



**Plug Valves Lubricated, Sleeved & Lined**

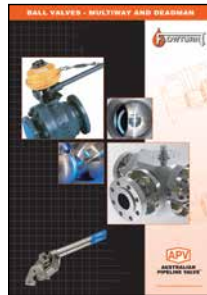


**Oilfield Products Valves & Wellheads**

**APV FAMILY OF BRANDS RANGE - CATALOGUES**



**Diamond Gear Gearboxes**



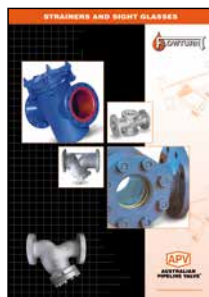
**Flowturn Ball Valves Multiway & Deadman**



**Flowturn Gate, Globe & Check Valves**



**Flowturn Instrument Valves**



**Flowturn Strainers & Sight Glasses**



**Steamco Steam Valves**



**Supercheck Wafer Check Valves**



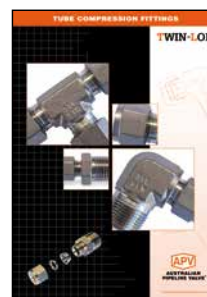
**Superseal Butterfly Valves**



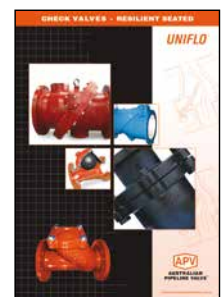
**Superseal Industrial Ball Valves**



**Torqturn Actuators**



**TwinLok Tube Fittings**



**Uniflo Check Valves**

*Contact us for your local stockist/distributor*

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# INTRODUCTION

The majority of this information is common knowledge to experienced valve and gearbox users. When properly installed in applications for which they were designed, Australian Pipeline Valve (APV) - Diamond Gear gearboxes will give long reliable service. This instruction is only a guide for installation and operation on standard service and covers general maintenance and minor repairs. A professional APV approved engineering facility should be utilised for reconditioning or major repairs.



**Note**

*We do recommend however that this entire document be read prior to proceeding with any installation or repair. Australian Pipeline Valve and its parent company take no responsibility for damage or injury to people, property or equipment. It is the sole responsibility of the user to ensure only specially trained valve repair experts perform repairs under the supervision of a qualified supervisor.*

## RESPONSIBILITY FOR VALVE/GEARBOX APPLICATION

The User is responsible for ordering the correct gearboxes. The user is responsible for ensuring APV - Diamond Gear gearboxes are selected and installed in conformance with the torque service and design temperature requirements. Prior to installation, the gearbox drawing and nameplates should be checked for proper identification to ensure the gearbox is of the proper type, material and is of a suitable size and temperature rating to satisfy the requirements of the service application.



**Caution**

*Do not use gearboxes in applications where the temperature is higher than the allowable working values. Gearboxes should not be used in environments if not compatible with the gearbox materials of construction, as this will cause chemical attacks, leakage, valve failure.*

## RECEIVING INSPECTION AND HANDLING

Gearboxes should be inspected upon receipt to ensure:

- Conformance with all purchase order requirements.
- Correct type, model, size, body and trim materials.
- Any damage caused during shipping and handling to end connections, hand wheel or stem.



**Caution**

*The User is advised that specifying an incorrect gearbox for the application may result in injuries or property damage. Selecting the correct gearbox type, material and mounting, in conformance with the required performance requirements is important for proper application and is the sole responsibility of the user.*

# SAFETY INFORMATION

The following general safety information should be taken in account in addition to the specific warnings and cautions specified in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered in this I.O.M.



**Caution**

- *Gearbox surface temperature may be dangerously too hot or too cold for skin contact.*
- *Ensure adequate ventilation is available for service.*

This manual provides instructions for storing, general servicing, installation and removal of gearboxes.

APV and it's resellers refuse any liability for damage to people, property or plant as well as loss of production and loss of income under any circumstances but especially if caused by: Incorrect installation or utilisation of the gearbox or if the gearbox installed is not fit for intended purpose. It is the sole responsibility of the user to ensure the gearbox type and materials are correctly specified.

DURING OPERATION TAKE INTO ACCOUNT THE FOLLOWING WARNINGS:

- a- The gearboxes internal parts shall be handled with care avoiding scratches or surface damage.
- b- All tools and equipment for handling the internal parts shall be soft coated.
- c- Gearboxes can be fitted with seals in Buna, Viton, etc., hence high temperatures will damage sealing components.

For all operations make reference to position number on part list of the applicable drawing listed.



**Caution**

*Personal injury may result from sudden release of any process pressure. APV recommends the use of protective clothing, gloves and eye wear when performing any installation or maintenance.*

*Isolate the valve from the system and relieve pressure prior to performing maintenance.*

*Disconnect any operating line providing air pressure, control signals or electrical power to actuators.*



**Caution**

*If a gasket seal is disturbed while removing or adjusting gasketed parts, APV recommends installing a new gasket while reassembling. A proper seal is required to ensure optimum operation.*


**Caution**

*Potential HIGH PRESSURE vessel - be aware of high-pressure hazards associated with the attached valve or other actuated device when installing or performing maintenance on the operator. Do not remove the operator bolts from the valve or actuated device unless the valve or device stem is secured or there is no pressure in the line.*

*For maintenance and/or disassembly of the operator when installed on the valve, ensure that the operator is not under thrust or torque load. If the valve must be left in service, the valve stem must be locked in such a way as to prevent any movement of the valve stem.*

*Do not manually operate the operator with devices other than the installed hand-wheel. Using force beyond the ratings of the operator and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches, or other devices on the operator handwheel may cause serious personal injury and/or damage to the operator and valve.*

*Do not exceed any design limitations or make modifications to this equipment without first consulting us.*

*Use of the product must be suspended any time it fails to operate properly.*

*Standard gearboxes are not suitable for motor actuation. A special heavy duty version can be specified for this purpose.*

*Do not use replacement parts that are not genuine Diamond Gear parts, as serious personal injury and/or damage to the operator and valve may result.*

## **1.0 DESCRIPTION**

The Diamond Gear WG series worm gear operators offer simple and reliable manual positioning of valves, dampers and other quarter turn devices. All Diamond Gear WG units combine rugged construction, light weight and modular design to provide the most efficient and cost effective solution for actuation of process valves such as butterfly, ball and plug valves. WG series have an optional locking device.

Gearboxes should be sized with at least a 40% safety factor or even more if high or low temperature or dirty service or infrequent use. Valves should be regularly opened to avoid sticking. Most valves will increase in torque over time as debris, corrosion, increased pressure, erosion, infrequent use, sticking of seats, etc., all effect torque. Bear in mind, some valves like plug valves need regular lubrication. Also the theoretical torque of a valve can be dramatically different to the actual torque.

## 2.0 STORAGE

WG Gear Operators don't have a shelf life however, store in a clean, dry area protecting the input and output bores from corrosion and damage by sealing each unit in a plastic bag.

Store on wooden skids to protect the machined mounting flange. If the operators must be stored outside, they must be covered in polyethylene with silica gel crystals to absorb moisture. Input shafts should be rotated every three months to mix lubricant.

## 3.0 OPERATION

Operation of the hand wheel will actuate the process valve.

A limit Stop arrangement allows adjustment of the stroke by  $\pm 5^\circ$  from either open or closed range. This can be achieved by adjusting the two stroke limiting screws to the extent desired. For normal operation of the valve, ensure the screws to be set in the extreme out position.

An open/close visual indicator on top of the gearboxes indicates degree open/closed. 'Open' and shut indicators are marked, ensure they are correctly synchronised.

## 4.0 INSTALLATION

WG gearboxes can be direct mounted or fitted with a bracket and adaptor. Ensure adaptors are manufactured from high strength steel such as 17-4PH, S31803, CR13, 410, 4140, XM-19, etc. Also ensure only high tensile bolts are used to secure the gearbox and bracket. Gearboxes can be supplied with a pre bored stem and keyway or with a small starter hole allowing client to machine. Do not machine a larger shaft hole and keyway than the maximum shown in the WG brochure and drawing. After ensuring mounting patterns are drilled and tapped correctly, install as follows: -

1. Ensure the valve and gear are in the same synchronised position (open or closed). Remove the gear indicator to ensure the input bore and shaft lines up with the valve stem.

*Note: Due to the different stop settings of each valve, the gearbox indicator may not be exactly synchronised with the position of the valve. Accurate settings should be determined by the actual position of the valves, plug, disc or ball.*

2. Lower gear box over the valve stem onto the valve mounting pad, ensuring the mounting holes on the bottom of the gear box align with the valve mounting pad or bracket.
3. Bolt the operator onto the bracket or valve then reinstall gear indicator ensuring the indicator is correctly synchronised with the valve position.

### 4.1 SETTING ADJUSTMENT SCREWS

1. Move the valve to the fully closed position. Set the adjustment bolt clockwise until it makes contact with the segment in the gear then lock the adjustment screw in place with the lock nut.
2. Move the valve to the fully open position.

*Note: If the valve is installed in the line and you cannot see if the valve is full open, count the number of turns of the handwheel required to reach 90 degrees. For example, if the gear box is a 100:1 ratio, rotate the handwheel 25 times to reach 90 degrees. This can still be inaccurate and it is recommended to remove the valve from the line and properly calibrate the operator at the next opportunity.*

3. Set the other adjustment screw clockwise until it makes contact with the segment inside the gear. Lock the adjustment screw with the lock.



**Note**

**Do not use oversize handwheels or leverage/cheater bars. This can result in damage to the gear box.**

## 5.0 TROUBLESHOOTING

SL NO.	FAULT	PROBABLE CAUSE	REMEDIAL ACTION
1.	Valve not opening/ closing even when handwheel is rotated	Worm to shaft mechanism broken due to over loading.  Handwheel to shaft connection failed, key sheared/ missing.	Open gear box and replace damaged parts.  Check handwheel to shaft joint and replace parts if broken.
2.	Full open/ closing of valve not achieved/ obtained	Improper adjustment of limit stop screw on WG.  Fixing bolts between valve and WG loose. Play between the joint.  Excessive play in adaptor linkage/ keyway.	Re-adjust limit stop screws and lock in position.  Check mounting between valve and WG. Tighten nuts after aligning in correct position.  Check linkage between valve and shaft and gear box. Replace key, if required.
3.	Valve opening/ closing found to be more than 90°, Over closing/ over opening	Improper adjustment of limit stop screws.	Loosen locknuts. Adjust stopper screws to the desired opening/ closing and tighten locknuts.
4.	Excessive force required for handwheel rotation	Excessive valve torque. WG not selected properly.	Check valve torque and replace with higher size WG, if required.



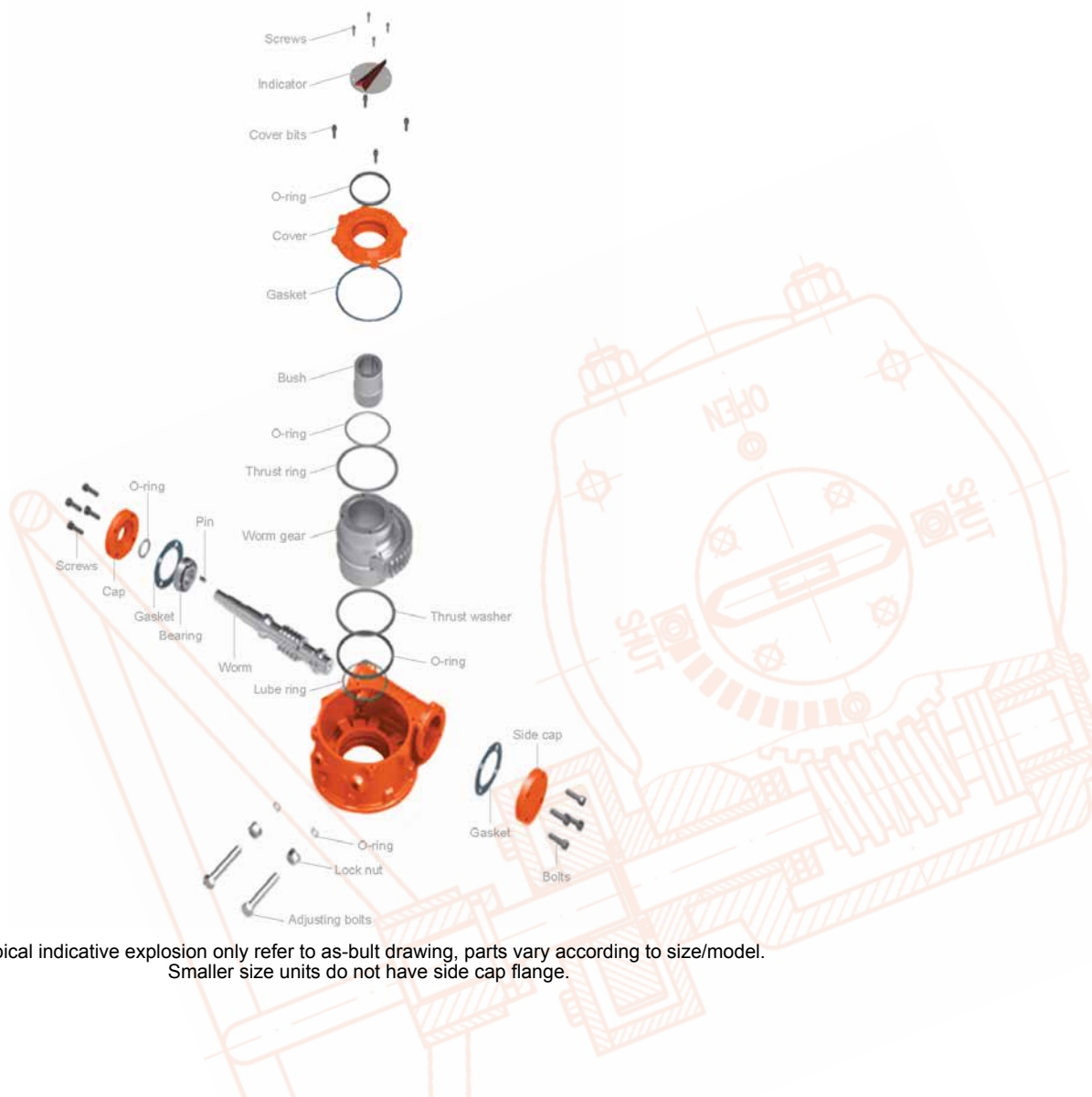
## 6.0 MAINTENANCE

Gearboxes are factory pre greased for life depending on the environment and service, for water resistant service. Inspect the internal gears and bearings annually and re-lubricate where required. Obviously for special, critical or frequent service applications, inspect the internals more regularly. To inspect the internals, remove cover bolts and indicator plate, O-rings and cover gasket. To inspect bearings, remove screws from end caps. Always replace O-rings and gaskets before re-assembly.

Should extra lubricant be required, use suitable multipurpose grease containing 'EP' additive that is non separating and contains no additive that will damage Viton or Buna O-rings.

Complete overhaul or extra ordinary repairs should be sent back to APV. However, it is usually cheaper to replace the unit with a brand new operator. Refer to diagram 1 for typical bill of material explosion. Only a gear box expert should attempt complete disassembly and repair.

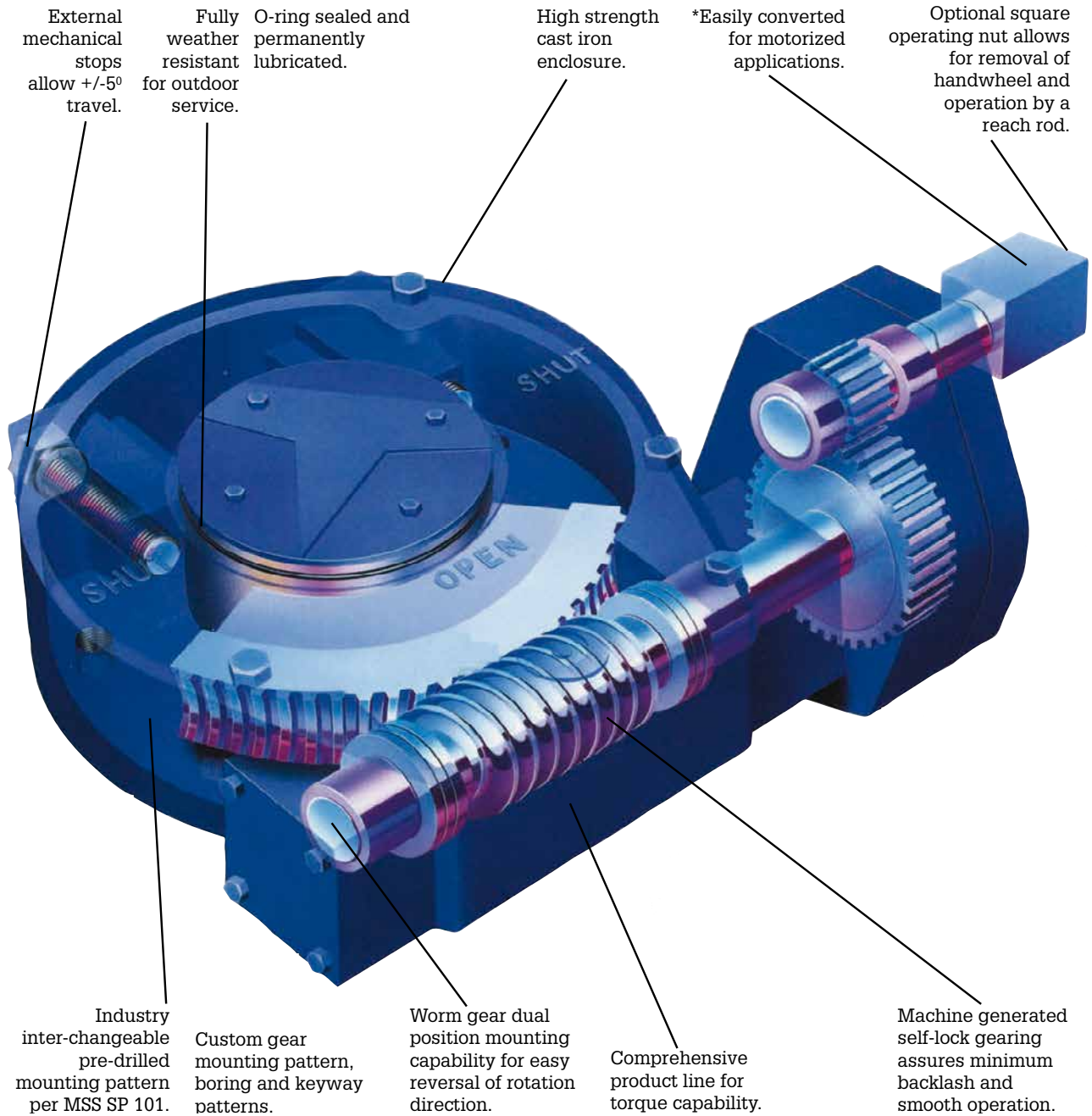
**EXPLOSION DIAGRAM 1**



Typical indicative explosion only refer to as-built drawing, parts vary according to size/model.  
Smaller size units do not have side cap flange.

# APPENDIX 1

**DIAGRAM 2**

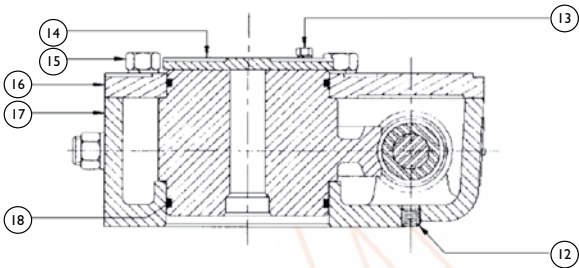
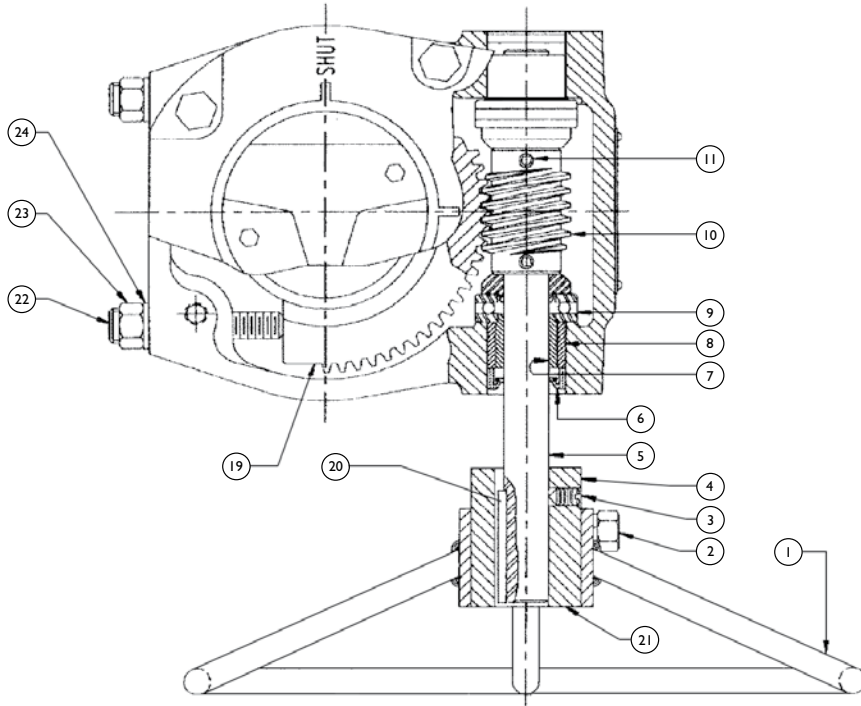


\* Optional heavy duty spur gear design required for motor operation.

# APPENDIX 2

WG008W ~ WG208W

DIAGRAM 3



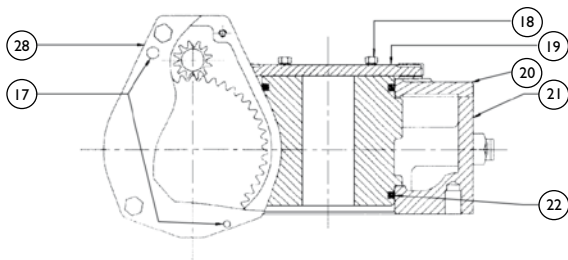
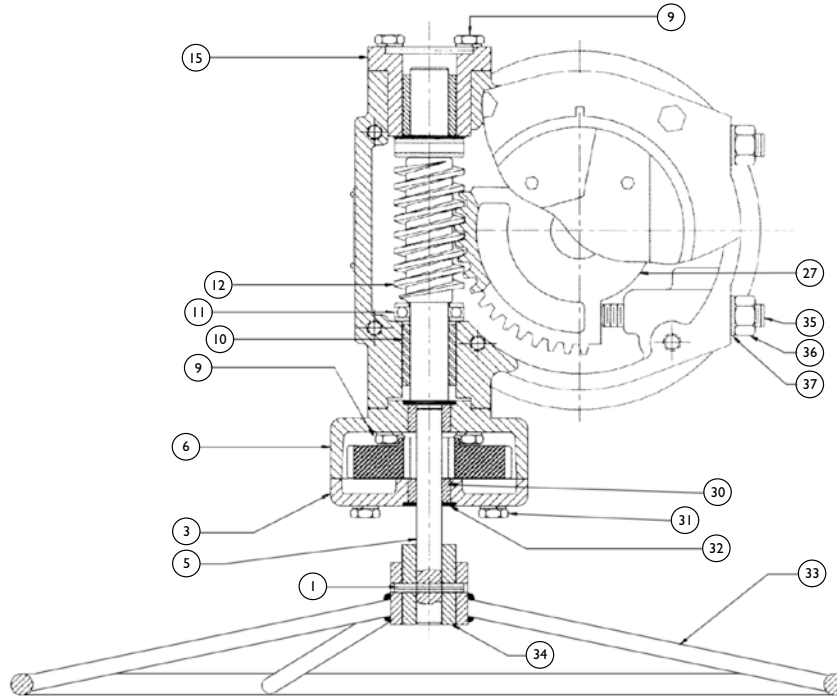
### BILL OF MATERIALS

NO	PART NAME	QTY	MATERIAL
1	HANDWHEEL	1	CARBON STEEL
2	SET SCREW	1	CARBON STEEL
3	STEM KEY	1	CARBON STEEL
4	INPUT SHAFT	1	AISI 1045
5	OIL SEAL	1	RUBBER
6	BEARING	2	CU-BASE ALLOY
7	OIL BEARING	2	CU-BASE ALLOY
8	THRUST BEARING	2	COMMERCIAL
10	WORM	1	AISI 1045
12	PIN	2	CARBON STEEL
15	PLUG	2	CARBON STEEL
16	BOLT	2	CARBON STEEL
17	INDICATOR PLATE	1	CAST IRON
18	BOLT	4	CARBON STEEL
19	COVER	1	CAST IRON
20	HOUSING	1	CAST IRON
21	O-RING	2	RUBBER
23	WORM GEAR	1	DUCTILE IRON
24	2" SQ OPERATING NUT	1	CARBON STEEL
25	STOP SCREW	2	CARBON STEEL
26	HEX NUT	2	CARBON STEEL
27	LOCKWASHER	2	CARBON STEEL

Indicative drawing only. Refer to as-built drawing.

WG308W ~ WG508W

DIAGRAM 4

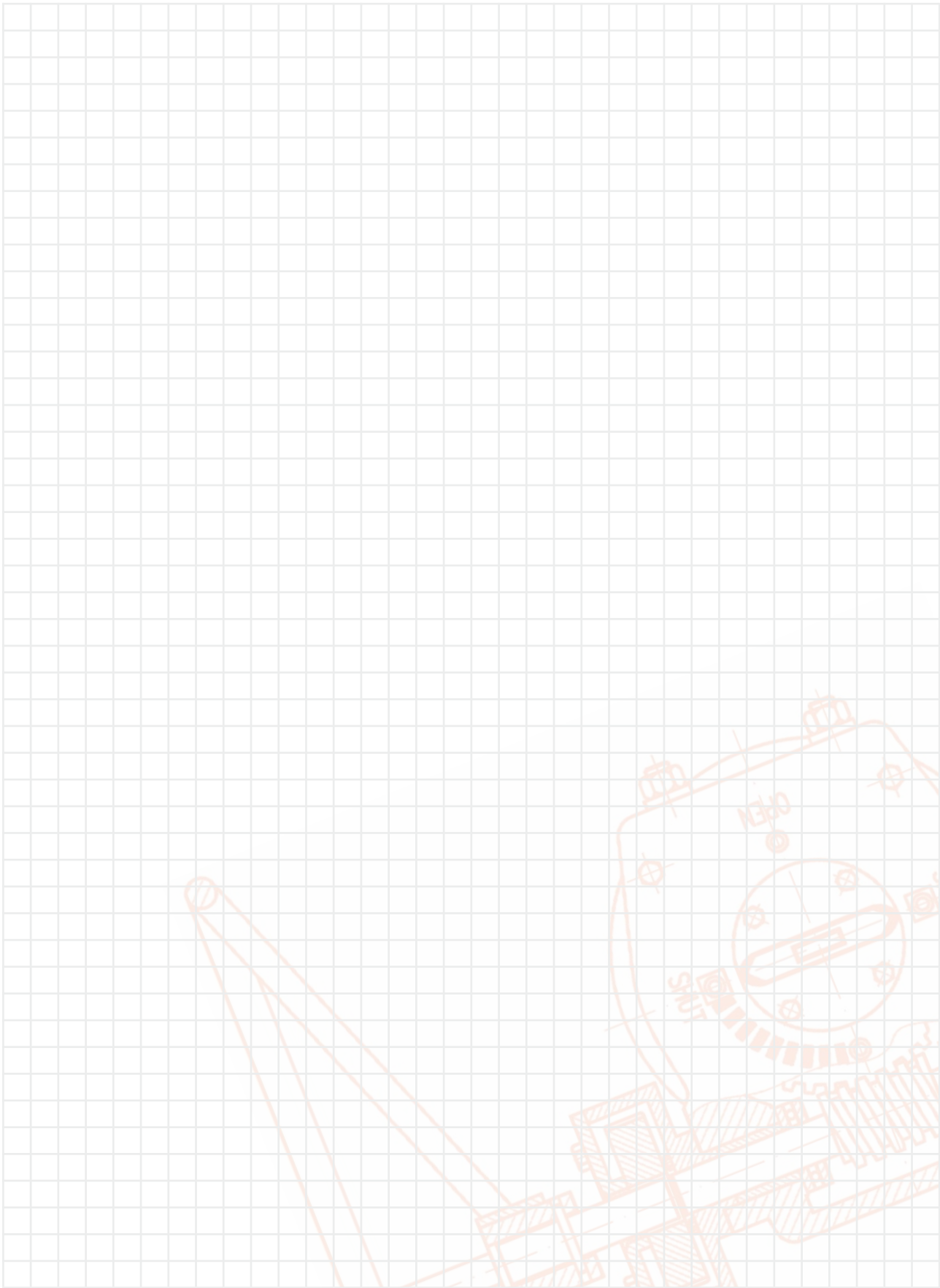


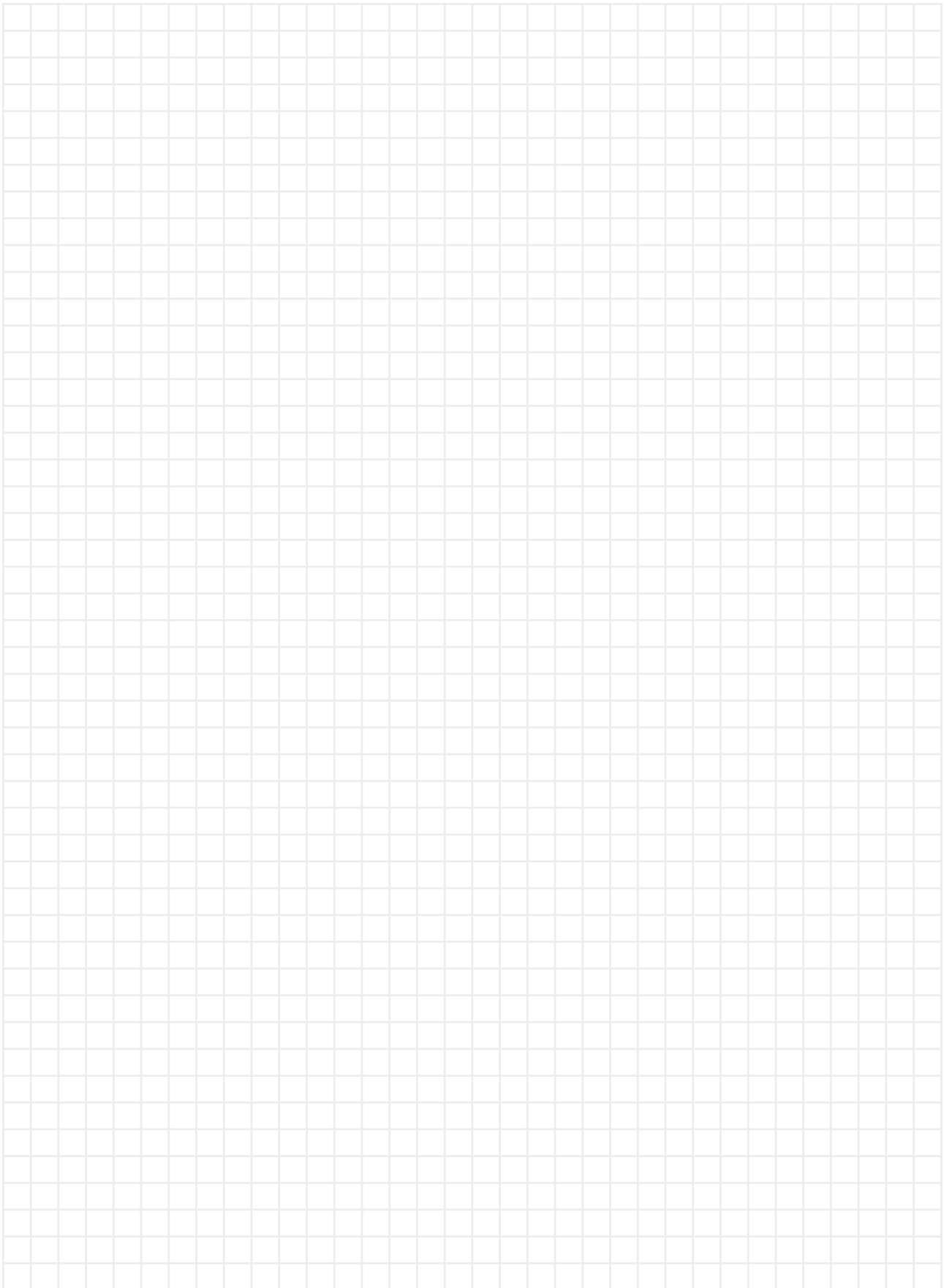
**BILL OF MATERIALS**

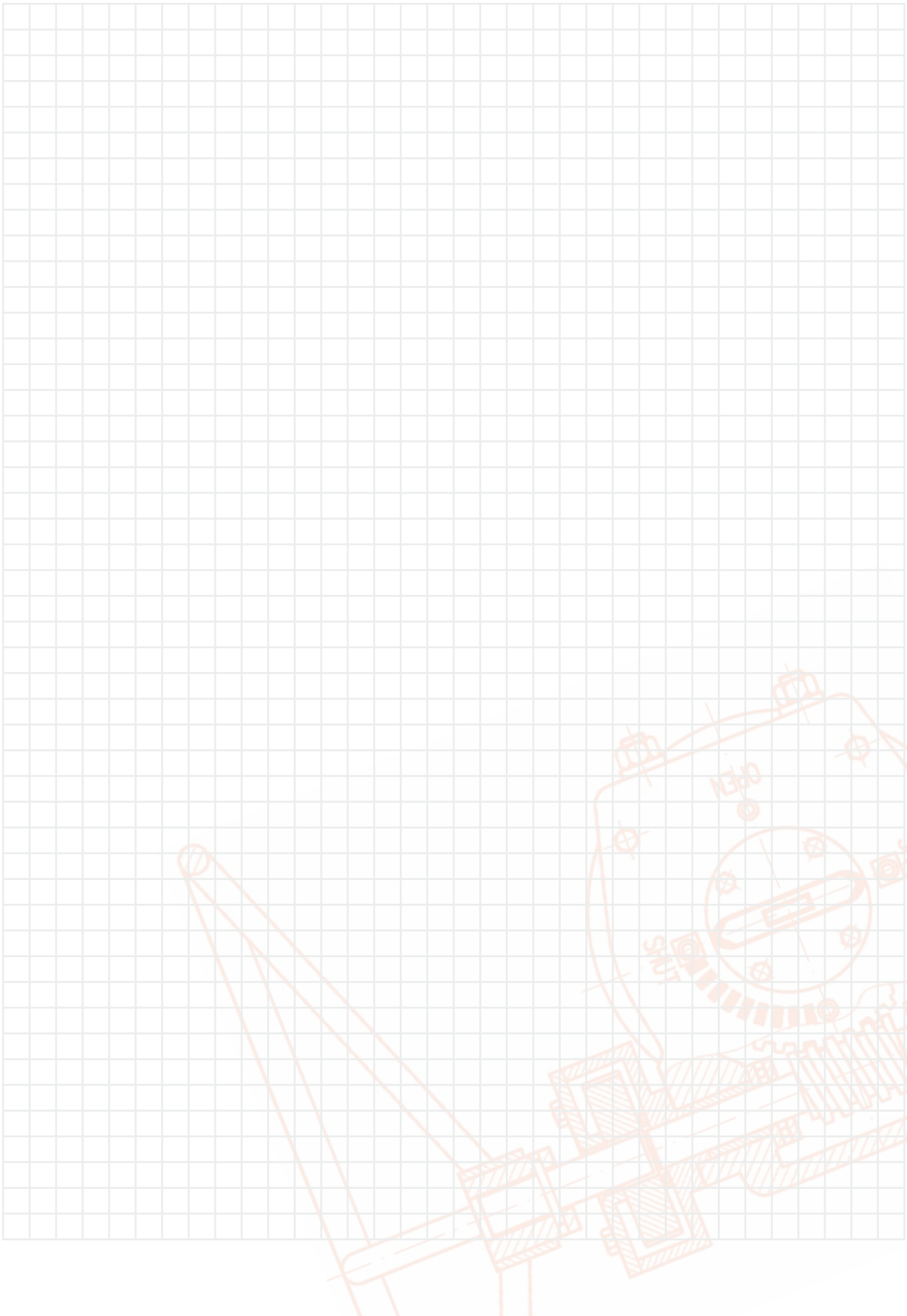
NO	PART NAME	QTY	MATERIAL
1	SLOTTED SPRING PIN	1	CARBON STEEL
3	SPUR GEAR COVER	1	CAST IRON
5	INPUT SHAFT	1	AISI 1045
6	SPUR GEAR HOUSING	1	CAST IRON
9	BOLT	4	CARBON STEEL
10	BEARING	1	CU-BASE ALLOY
11	THRUST BEARING	1	COMMERCIAL
12	WORM	1	AISI 1045
15	BEARING BLOCK	1	CARBON STEEL
17	LOCATOR PINS	2	CARBON STEEL
18	BOLT	4	CARBON STEEL
19	INDICATOR PLATE	1	CAST IRON
20	COVE	1	CAST IRON
21	HOUSING	1	CAST IRON
22	O-RING	2	RUBBER
27	WORM GEAR	1	DUCTILE IRON
28	SPUR GEAR	1	CARBON STEEL
30	BEARING	1	CU-BASE ALLOY
31	BOLT	4	CARBON STEEL
32	SEAL COVER	1	RUBBER
33	HANDWHEEL	1	CARBON STEEL
34	2" SQ. OPERATING UNIT	1	CARBON STEEL
35	STOPSCREW	2	CARBON STEEL
36	HEX NUT	2	CARBON STEEL
37	LOCKWASHER	2	CARBON STEEL

Indicative drawing only. Refer to as-built drawing.











# AUSTRALIAN PIPELINE VALVE®

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