

KOBELT

7174 Rudder Feedback Unit

Owner's Operation, Installation & Maintenance Manual



TABLE OF CONTENTS

1	Introduction	4
1.1	Contact	4
1.2	Compliant Use	4
1.3	Copyrights & Trademarks	4
2	Safety.....	5
2.1	Safety Alerts	5
2.2	Notice to Installer	5
2.3	Product Hazards	6
3	Product Description	6
3.1	Technical Specifications	7
3.2	Model Code Key	7
4	Installation	8
4.1	Receipt.....	8
4.2	Mechanical	8
4.3	Electrical	9
5	Commissioning	12
5.1	Electrical Check.....	12
6	Maintenance	12
6.1	Preventative Maintenance	12
6.2	Service	12
6.3	Recommended Spare Parts	13
7	Troubleshooting	14
8	Warranty.....	15
9	Appendix A: Installation Dimensions	16
10	Appendix B: Parts List	17

1 INTRODUCTION

1.1 CONTACT

Kobel Manufacturing Co. Ltd.
8238 129th Street
Surrey, British Columbia
Canada, V3W 0A6

Sales Tel: +1-604-572-3935
Fax: +1-604-590-8313
Email: sales@kobelt.com
Website: www.kobelt.com

This document is intended to clearly present comprehensive product data and provide technical information to assist the end user in design applications. Kobelt reserves the right, without notice, to change the design, or construction, of any products and to discontinue or limit distribution of any products. Kobelt also reserves the right to change, or update, without notice, any technical information contained within this document.

Kobelt recommends that customers visit our website to check for updates to this Manual. Once a product has been selected for use, it should be tested by the user to ensure proper function in all possible applications. For further instructions, please contact our distributors or visit our website.

1.2 COMPLIANT USE

This device is only intended for use by persons trained in operating marine systems.

The installer shall:

- Only use non-defective products.
- Check the safety of operation and the condition of the device before each use.
- Verify that the product is operational at all times and keep it in good working conditions.

Only Kobelt Manufacturing Co. Ltd. Authorized Dealers or Authorized Technicians are to repair Kobelt products.




1.3 COPYRIGHTS & TRADEMARKS

All product names, logos and brands are property of their respective owners. All company, product and service names used in this manual are for identification purposes only. Use of these names, logos, and brands does not imply endorsement.

2 SAFETY

2.1 SAFETY ALERTS

Throughout this manual, the following symbols, and their accompanying explanation, are used to alert the user to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are stated below.



 DANGER	This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	This symbol indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
NOTICE	This symbol informs the reader of events not related to personal injury but which there is a risk of damage to property or equipment.
SAFETY INSTRUCTIONS	This symbol informs the reader of safety-related instructions or procedures.

2.2 NOTICE TO INSTALLER

Disregarding the following safety measures can result in an accident, causing severe injury to personnel and damage to material assets.

- Only use the product as directed in this manual.
- Never put the product into service if there is evidence of visible damage.
- Never put the product into service before fully completing installation and commissioning.
- Do not carry out any modifications to the product.
- Only use authentic Kobelt spare parts.
- Observe all local regulations, directives and laws during the installation of this product.
- All installation, commissioning, and maintenance work must only be conducted by qualified personnel. (For the purpose of this manual, qualified personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.)
- Observe all specifications in this manual. If these guidelines are not followed and damage occurs, the warranty will be voided.

2.3 PRODUCT HAZARDS

 WARNING	Disconnect Power: Turn off power at distribution panel before beginning installation to protect installer from electrical hazards.
 CAUTION	Voltage and Current Compatibility: Confirm that the power source is compatible with the maximum voltage and current ratings of is product variant. Failure to do so could result in damage or fire.

3 PRODUCT DESCRIPTION

The Kobelt 7174 Rudder Feedback Unit (RFU) can be configured to have up to four potentiometers and two rudder end stop switches per side. It can be used as an input to Full Follow Up (FFU) electronic steering systems, autopilots, and rudder angle indicators. Movement of the rudder adjusts the internal potentiometer(s). The 7174 Rudder Feedback Unit can be used for steering applications, other marine applications, or industrial installations. The 7164 is designed for indoor and outdoor installation with a robust die cast bronze and stainless-steel construction to provide a long service life in a harsh marine and salt-water exposed environment.

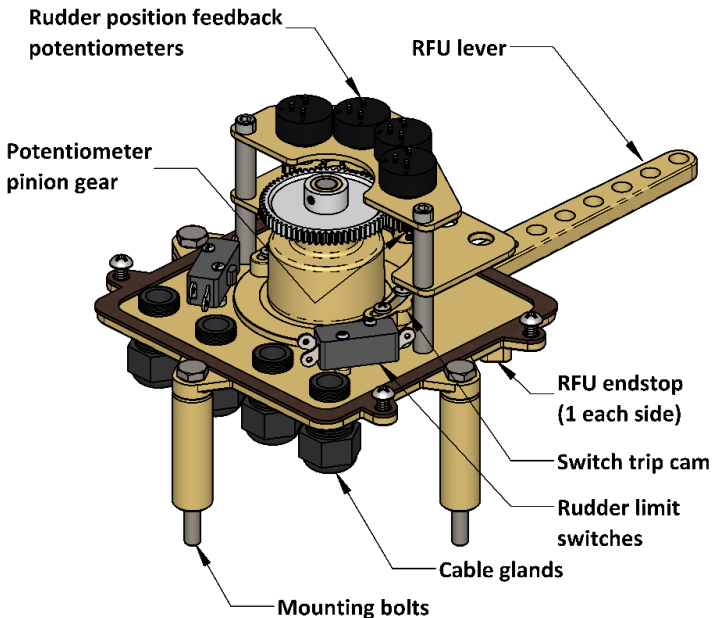


Figure 1: Product Overview

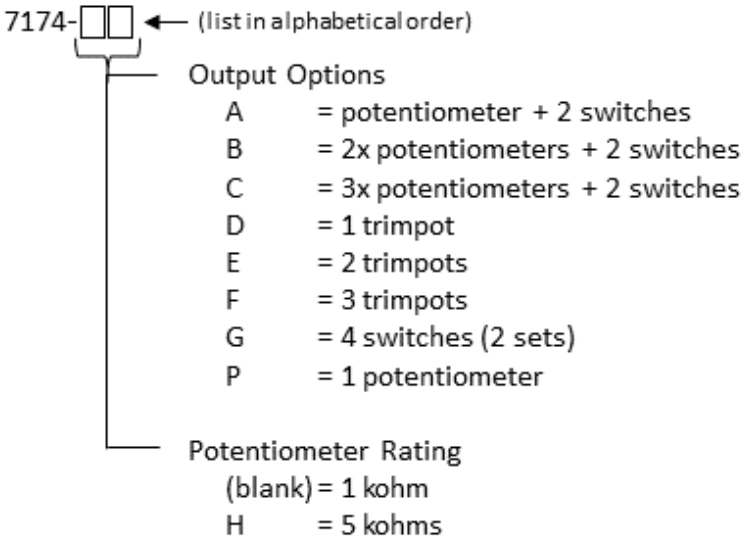
3.1 TECHNICAL SPECIFICATIONS

Table 1: 7174 Technical Data – Standard Variants

MODEL	7174	
KOBELT PART #	7174-A	7168-B
POTENTIOMETER	1kΩ	2x 1kΩ
MAX. POTENTIOMETER POWER	1 W	
SWITCH CONTACTS	2x DPDT	2x DPDT
CONTACT RATINGS	250VAC/24VDC – 10A	
CONNECTIONS	1x 3C/18 Pigtail	2x 3C/18 Pigtail
OPERATING TEMPERATURE	-25°C to 70°C [-13°F to 158°F]	
PRODUCT WEIGHT	2.9 kg [6.5 lbs]	
SURFACE FINISH	Plain Bronze	

Technical data and specifications are also available from our datasheet posted on www.kobelt.com or the technical drawings in [Appendix A](#).

3.2 MODEL CODE KEY



4 INSTALLATION

4.1 RECEIPT

Kobelt offers the 7174 rudder feedback unit in several configurations (reference [section 3.2](#)). Upon receipt of the device ensure that the model number and serial number are noted on the table in page 2 of this manual. The serial number can be found in the location noted at right. This model number will determine what spare parts are applicable.

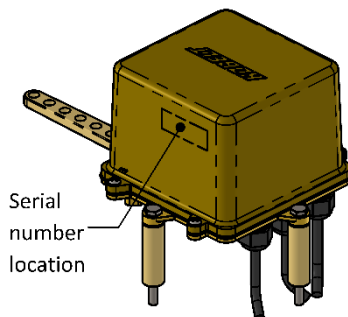


Figure 2: Part Identification

4.2 MECHANICAL

Ideally, the Rudder Feedback Unit should be mounted as close as possible to the tiller arm. Excessive lengths of connecting rods will lead to flexing and inaccuracies in the reported rudder position.



CAUTION

Minimize the connecting rod length to minimize errors in reported rudder position.

The Rudder Feedback Unit is equipped with (3) three ¼ UNC screws installed through the top surface for direct mounting. Reference the general arrangement drawing in [Appendix A](#) for the bolt pattern.

4.2.1 Mechanical Linkage

The RFU lever is provided with seven 5/16" [8mm] diameter holes on a 5/8" [16 mm] pitch. Select the outer most hole on the RFU lever possible to minimize errors arising from backlash. Locate the connecting rod position on the tiller arm to ensure that rudder stop limit switches trip without crashing into the RFU end stops (+/-44°). Follow the table below to ensure that the gearing between rudder movement and RFU are synchronized:

Table 2: RFU / tiller synchronization

7174		
Rudder Movement (H.O. to H.O.) (deg)	Travel Ratio	Dimension 'R' in [mm]
70	1.16:1	9.04 [230]
74	1.11:1	8.62 [219]
80	1.04:1	8.07 [205]
84	1.00:1	7.75 [197]
90	0.95:1	7.33 [186]
94	0.91:1	7.09 [180]

When installing the RFU remember to follow these tips:

- Ensure **90°** relationships between the tiller arm, RFU lever and connecting link are maintained with the rudder in mid-ships position during alignment of all mechanical components.
- Ensure rudder feedback arm and rudder stock clamp swing equally each side of mid-ships position.
- Locate 7174 Rudder Feedback Unit near rudder stock on a level surface.
- Threaded connection rod may need to be adjusted in order to achieve the correct mounting geometry.

Reference the figure below for clarification.

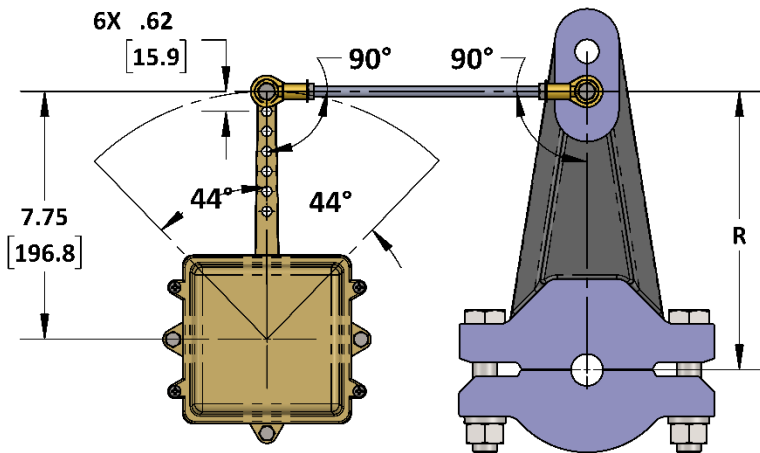


Figure 3: RFU Installation

Note: Connection kits are available from Kobelt (P/N: 7174-010X).

4.3 ELECTRICAL

When making the electrical connections, locate the electrical junction box;

- Within 6 feet [1.8 m] of the rudder feedback unit.
- Placed as to protect external electrical cable from damage.

The cable gland locations are shown in **Error! Reference source not found.** and the internal wire connections are shown in Figure 4: 7174 Potentiometer Wiring Diagram and Figure 5: 7174-XG Internal Wiring Diagram respectively.

The operating direction of the Potentiometer in relation to the Rudder Feedback Unit handle is shown in **Error! Reference source not found.**

The product’s 3C/18AWG electrical cable contains the following wires and related functions:

Table 3: 7174 Wire Connections

7174				
Wire #	Wire Name	Colour	Gauge	Function
1	POT+	White	18AWG	FFU potentiometer power supply connection.
2	POT WIPER	Green	18AWG	FFU potentiometer signal connection.
3	POT-	Black	18AWG	FFU potentiometer ground connection.

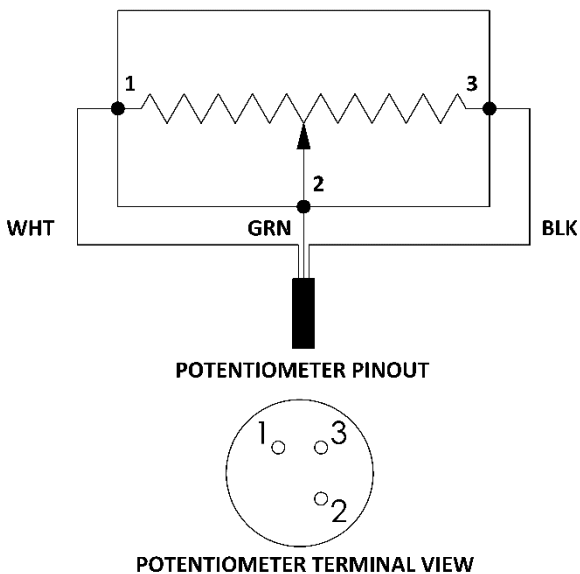


Figure 4: 7174 Potentiometer Wiring Diagram

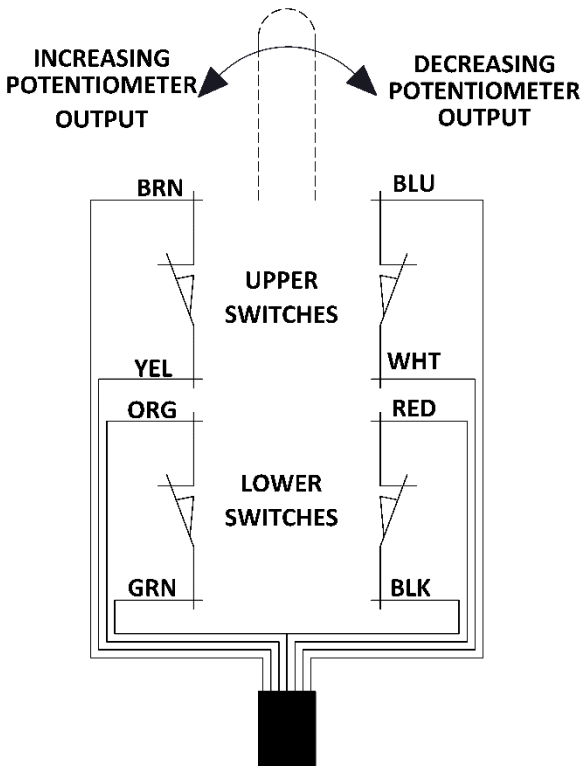



Figure 5: 7174-XG Internal Wiring Diagram

When wiring the rudder end stop switches directly to the steering solenoid valves, it is recommended to place a 1N4007 protection diode across the coil terminals.

 WARNING	<p>Failure to use a TVS diode when switching solenoid coils will reduce the life of the rudder end stop switches.</p>
--	---

5 COMMISSIONING

5.1 ELECTRICAL CHECK



CAUTION

Ensure that the rear cover is installed and secured before powering on the 7174.

- Confirm that the electrical connections to the 7174 have been made.
- Confirm that port and starboard rudder movements are displayed correctly at the rudder angle indicators.
- Confirm that the rudder range of motion is reported correctly to the rudder angle indicators and steering controller.
- Ensure that the rudder end stop switches trip before the rudder or RFU lever impacts the rudder stops. See [section 6.2.1](#) for adjusting.



CAUTION

The Functional Test should be carried out while the vessel is still at dock and before it is taken out to sea after installation has been completed.

6 MAINTENANCE

6.1 PREVENTATIVE MAINTENANCE

- Quarterly (4 times/year)
 - Visually inspect wire and cable insulation for splits or damage.
 - Ensure there is no visible corrosion on the unit.
 - Confirm that the rudder angle indicators indicate zero degrees when the rudder is centered
- Every (2) two years
 - Confirm all electrical screw terminals are secured.
 - Confirm cable glands are secured to cables.

6.2 SERVICE

6.2.1 Rudder End-stop Switches

To adjust the rudder end-stop trip position follow these instructions:

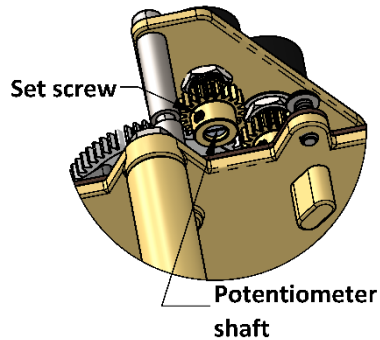
1. Position the rudder to the desired trip position.

2. Remove the RFU cover.
3. Locate the relevant switch trip cam (see **Error! Reference source not found.**).
4. Loosen the two screws and rotate the cam until the switch just trips and secure the two screws.
5. Repeat for the other switch.

6.2.2 Potentiometer Centering

When replacing the potentiometer or if the setting has become disturbed, follow these steps to center the output:

1. Position the rudder in the center (dead ahead) position.
2. Remove the RFU cover.
3. Locate the potentiometer in need of centering (see **Error! Reference source not found.**).
4. Connect a multimeter to the Pot – (white wire) and the Pot Wiper (green wire). Set the meter to read resistance.
5. Loosen the two locking set screws on the pinion gear with a 1/16-inch Allen key.
6. Using a short flat head screwdriver, rotate the potentiometer shaft until the meter reads half of the rated output (500 ohms for a 1K potentiometer).
7. Tighten the two locking set screws and replace the cover.



6.3 RECOMMENDED SPARE PARTS

Depending on the severity and criticality of service, it may be necessary to keep spare potentiometers on hand.

When purchasing replacement parts refer to Appendix B: Parts List at the back of this manual for Kobelt component Part Numbers.

NOTICE

It is recommended that any required service work on a Kobelt product be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.

7 TROUBLESHOOTING

If you encounter problems with the operation of your product, please refer to the troubleshooting suggestions before contacting Kobelt for assistance. If the steps below do not resolve your issue, please reach out either Kobelt directly or our Dealers in your area.

Table 4: Common Solutions

Problem (Issue encountered)	Cause (What it means)	Corrective Action (What to do)
Rudder Feedback Unit action is reversed.	Wiring is backwards.	Swap the POT+ and POT- output wires to their respective system connections.
Rudder Feedback Unit does not move rudder at all.	The rest of the system isn't hooked up correctly.	<ol style="list-style-type: none"> 1. Check system wiring. 2. Confirm wiring to Rudder Feedback Unit.
	Broken potentiometer or contact.	<ol style="list-style-type: none"> 1. Use a multi-meter to monitor the resistance of the wiring between potentiometer contacts. 2. Check for normal operation of the potentiometer by measuring the connection while moving the Rudder Feedback Unit. 3. Check potentiometer directions. 4. Replace any damaged potentiometers.
	Wiring is wrong.	Check wiring against User Manual wiring diagrams for Feedback Unit and connected Products.

8 WARRANTY

Kobel Manufacturing Co. Ltd. ("Kobel") warrants the Products and Parts manufactured by Kobel to be free from defects in workmanship or material and that said products are designed mechanically and functionally to perform to specifications.

This warranty is effective providing:

- The equipment is used within the intended operating conditions and in accordance with Kobel recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobel has provided

This warranty becomes invalid if the factory supplied serial number has been removed or altered on the product. This warranty does not cover cosmetic damage or damage caused by an act of God, accident, misuse, abuse, negligence or modification of any part of the product. This warranty does not cover damage due to improper operation or maintenance, connection to inappropriate equipment or attempted repair by anyone other than an authorized Kobel representative.

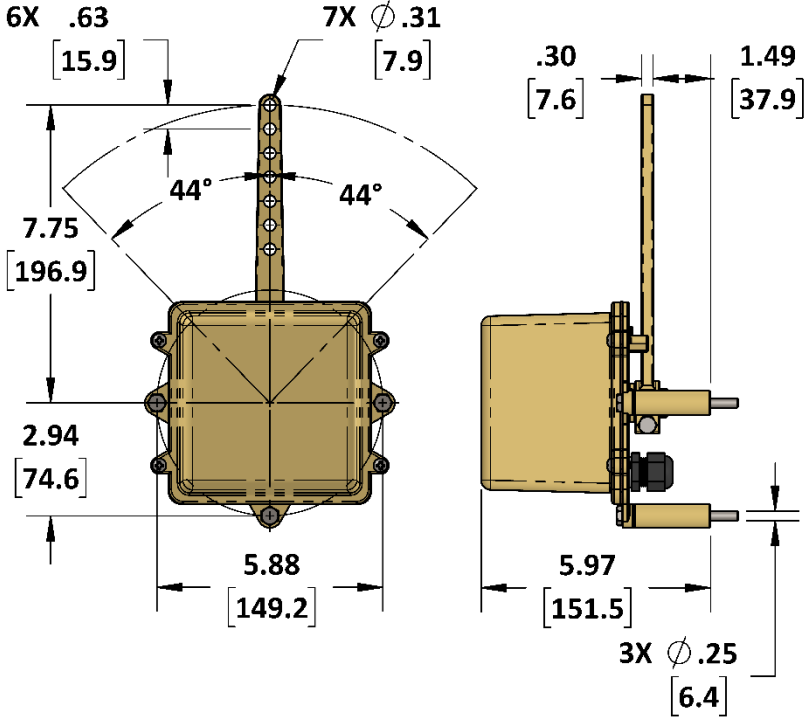
Upon identification of a potential issue or defect with a Kobel Product or Part, the Warranty Applicant ("Applicant") must immediately contact Kobel and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobel will then assess the cause of the defect and determine warranty applicability and appropriate remediation.

If any part is found to be defective, Kobel will replace said part FOB the Kobel factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobel's sole obligation to the Applicant will be to repair or replace the defective part with same or similar product, to a maximum value of the list price of the product or part. The Kobel warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobel, are subject to a warranty against manufacturer's defects in materials or workmanship for a period of two (2) years from the date of purchase.

Kobel will be responsible for all Products or Parts sold by Kobel but manufactured by 3rd party manufacturing companies. However, these products and parts are subject to applicable 3rd party warranties and may not be the same as the Kobel warranty.

9 APPENDIX A: INSTALLATION DIMENSIONS



10 APPENDIX B: PARTS LIST

7174-BD

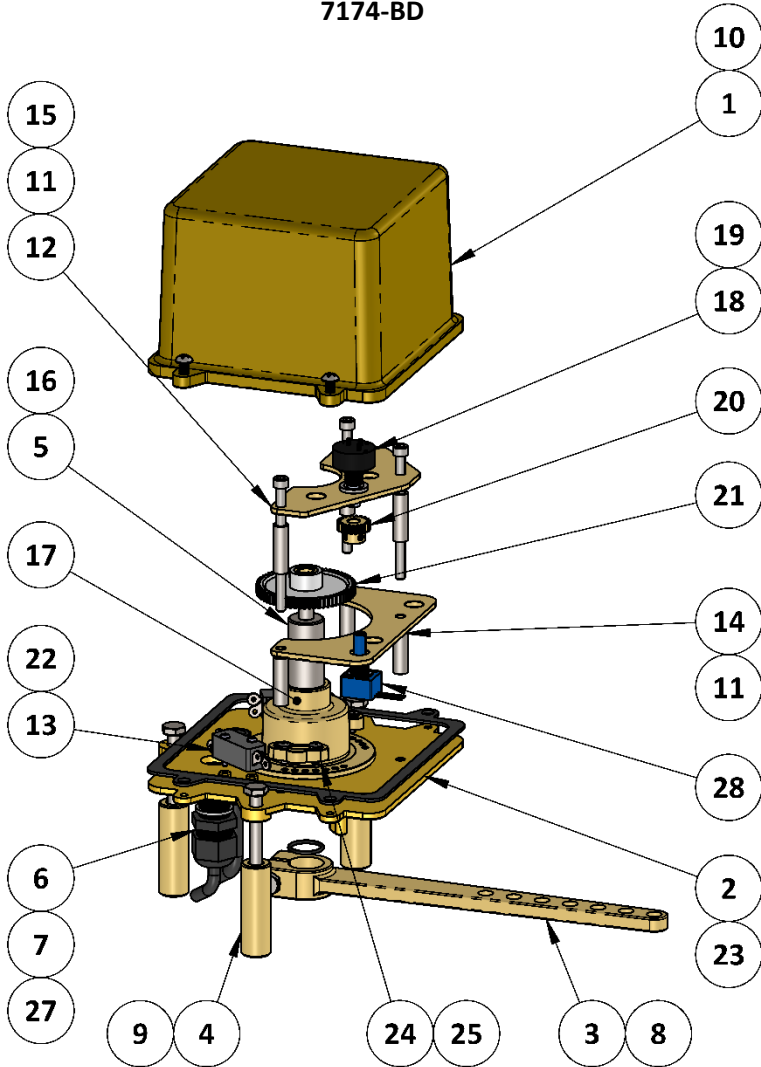


Figure 6: 7174-BD Parts Diagram

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	7174-0001	HOUSING
2	1	7174-0002	COVER; RUDDER FEED BACK UNIT
3	1	7174-0003	LEVER; RUDDER FEEDBACK UNIT
4	3	7174-0009	SPACER, BRASS
5	1	7174-0010	SHAFT
6	2	6001-0248	CABLE GLAND; M16 X 1.5, .197-.394 CABLE, PA6, BLACK
7	2	6001-0248-W-M16	WASHER, SEALING, M16, POLYETHYLENE
8	1	1001-1020	SCREW - HEX HD; 1/4-20 X 1-1/4, 18-8
9	3	1001-1048	1/4-20 X 3.0, HEX HD. CAPSCREW, SS
10	4	1010-0808	SCREW, RND HD PHIL, #10-24 X 1/2, 18-8 SS
11	6	7174-0008	SPACER, 7172, 1.04IN LG
12	1	7174-0007	POT BRACKET
13	2	6001-0104	MICROSWITCH
14	1	7174-0006	BRACKET; RUDDER FEEDBACK UNIT
15	3	1002-0844	CAP SCREW - SKT HD; #10-24 X 2-3/4 LG, 18-8
16	1	1101-0016	O-RING, 3/4 X 5/8 X 1/16, NBR70
17	1	7174-0004	CAM PLATE
18	1	POT-1	POTENTIOMETER, 1K, 1TURN, 340 DEG, 22MM DIA
19	1	6639-0001	SHIM WASHER, 10MM X 2MM, AISI 304
20	1	Y-3220	SPUR GEAR - BRASS; 32P/20T/B STYLE/.250IN BORE
21	1	YPB-3264	SPUR GEAR 64T DERLIN W/ 5/16 BRASS INSERT
22	4	1006-0310	SCREW, PAN HD SLOTTED, 3-48 X 5/8, 18-8
23	1	7174-0027	GASKET
24	2	7174-0005-C	CAM
25	4	1012-0606	SCREW, PAN HD, PHL DRIVE, 6-32 x 3/8IN, 18-8 SS
26	1	1024-0816	PIN, .1875 DIAMETER
27	2	6014-0002	CABLE; 4C/18AWG, 600V, GRY
28	1	TRIMPOT-1	POTENTIOMETER, TRIM, 10K, SINGLE TURN
29	1	6009-6230	CABLE TIE 0.1IN X 4IN 18LB BLACK

7174-B

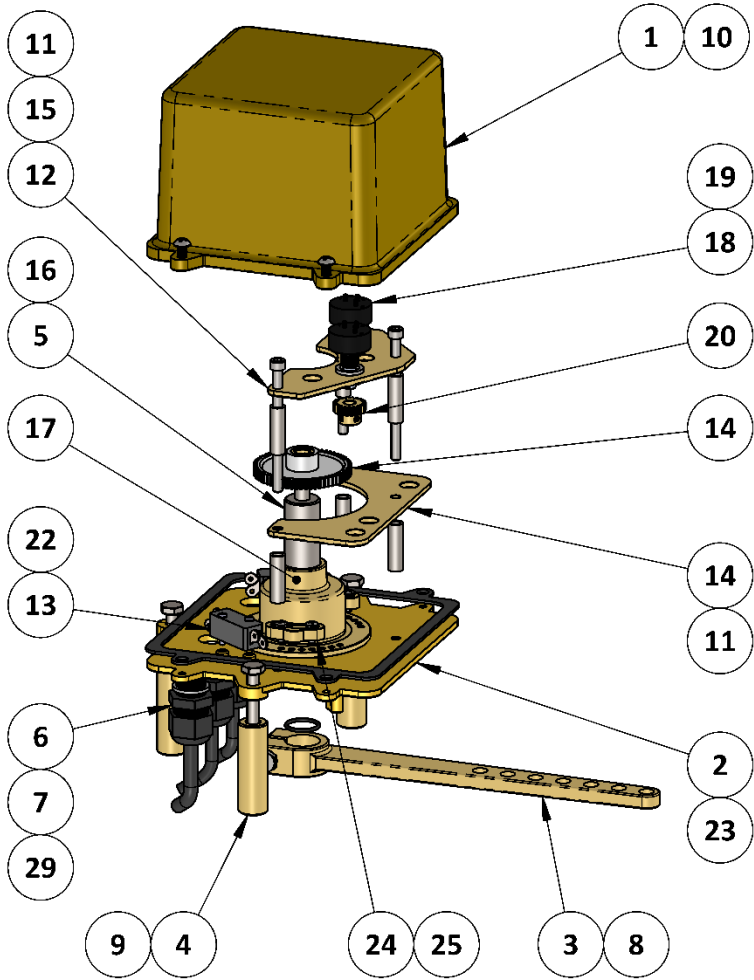


Figure 7: 7174-B parts list

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	7174-0001	HOUSING
2	1	7174-0002-4	COVER; RUDDER FEED BACK UNIT; 4 HOLES
3	1	7174-0003	LEVER; RUDDER FEEDBACK UNIT
4	3	7174-0009	SPACER, BRASS
5	1	7174-0010	SHAFT
6	3	6001-0248	CABLE GLAND; M16 X 1.5, .197-.394 CABLE, PA6, BLACK
7	3	6001-0248-W- M16	WASHER, SEALING, M16, POLYETHYLENE
8	1	1001-1020	SCREW - HEX HD; 1/4-20 X 1-1/4, 18-8
9	3	1001-1048	1/4-20 X 3.0, HEX HD. CAPSCREW, SS
10	4	1010-0808	SCREW, RND HD PHIL, #10-24 X 1/2, 18-8 SS
11	6	7174-0008	SPACER, 7172, 1.04IN LG
12	1	7174-0007	POT BRACKET
13	2	6001-0104	MICROSWITCH
14	1	7174-0006	BRACKET; RUDDER FEEDBACK UNIT
15	3	1002-0844	CAP SCREW - SKT HD; #10-24 X 2-3/4 LG, 18-8
16	1	1101-0016	O-RING, 3/4 X 5/8 X 1/16, NBR70
17	1	7174-0004	CAM PLATE
18	2	POT-1	POTENTIOMETER, 1K, 1TURN, 340 DEG, 22MM DIA
19	2	6639-0001	SHIM WASHER, 10MM X 2MM, AISI 304
20	2	Y-3220	SPUR GEAR - BRASS; 32P/20T/B STYLE/.250IN BORE
21	1	YPB-3264	SPUR GEAR 64T DERLIN W/ 5/16 BRASS INSERT
22	4	1006-0310	SCREW, PAN HD SLOTTED, 3-48 X 5/8, 18-8
23	1	7174-0027	GASKET
24	2	7174-0005	CAM
25	4	1012-0606	SCREW, PAN HD, PHL DRIVE, 6-32 x 3/8IN, 18-8 SS
26	1	6001-0311	PLUG, CABLE GLAND, M16 X 1.5, BLACK
27	1	1024-0816	PIN, .1875 DIAMETER
28	2	6014-0001	CABLE, 3C/18AWG, SVT, 300V, 105C
29	1	6014-0002	CABLE; 4C/18AWG, 600V, GRY
30	5	6009-6230	CABLE TIE 0.1IN X 4IN 18LB BLACK



Kobelt Manufacturing Co. Ltd.

8238 129th Street
Surrey, British Columbia,
Canada, V3W 0A6

Sales Tel: +1-604-572-3935

Fax: +1-604-590-8313

Email: sales@kobelt.com

Website: www.kobelt.com

Made in Canada / Printed in Canada