



## **7168 Rudder Feedback Unit**

### **Owner's Operation, Installation & Maintenance Manual**



NOTES:

[illegible]

## RECORD DATA BEFORE INSTALLATION FOR FUTURE REFERENCE

<b>Model #:</b>	
<b>Serial #:</b>	
<b>Date of Purchase:</b>	
<b>Date of Installation:</b>	

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# 1 INTRODUCTION

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## 1.1 CONTACT

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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.



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

 <b>WARNING</b>	<b>Disconnect Power:</b> Turn off power at distribution panel before beginning installation to protect installer from electrical hazards.
 <b>CAUTION</b>	<b>Voltage and Current Compatibility:</b> 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 ABOUT THE 7168 RUDDER FEEDBACK UNIT

## 3.1 PRODUCT DESCRIPTION

The Kobelt 7168 Rudder Feedback Unit is the most compact version of the Kobelt series of rudder feedback units. 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 7168 Rudder Feedback Unit can be used for steering applications, other marine applications, or industrial installations.

The 7168 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: 7168 Overview Diagram

## 3.2 TECHNICAL SPECIFICATIONS

Table 1: 7168 Technical Data – Standard Variants

MODEL	7168	
KOBELT PART #	7168-P	7168-PP
POTENTIOMETER	1kΩ	2 x 1kΩ
MAX. POTENTIOMETER POWER	1 W	
CONNECTIONS	1x 3C/18 Pigtail	2x 3C/18 Pigtail
OPERATING TEMPERATURE	-25°C to 70°C [-13°F to 158°F]	
PRODUCT WEIGHT	1.0 kg [2.2 lbs]	

## 4 INSTALLATION

### 4.1 MECHANICAL

Ideally, the Rudder Feedback Unit should be mounted in a central location at each station on-board the vessel to control steering operation.

- Within 6 feet [1.8 m] of electrical junction box.
- Placed as to protect external electrical cable from damage.

The Rudder Feedback Unit is equipped with (4) four clearance holes for #10 (M5) screws or bolts through the top surface for direct mounting.

#### 4.1.1 Mechanical Linkage Recommendations

- Ensure **90°** relationships 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 7168 Rudder Feedback Unit near rudder stock on a level surface.
- The threaded connection rod may need to be lengthen in order to achieve the correct mounting geometry.

*Note: Mounting adaptor kit is available from Kobelt (P/N: 7163-FAK).*

### 4.2 ELECTRICAL

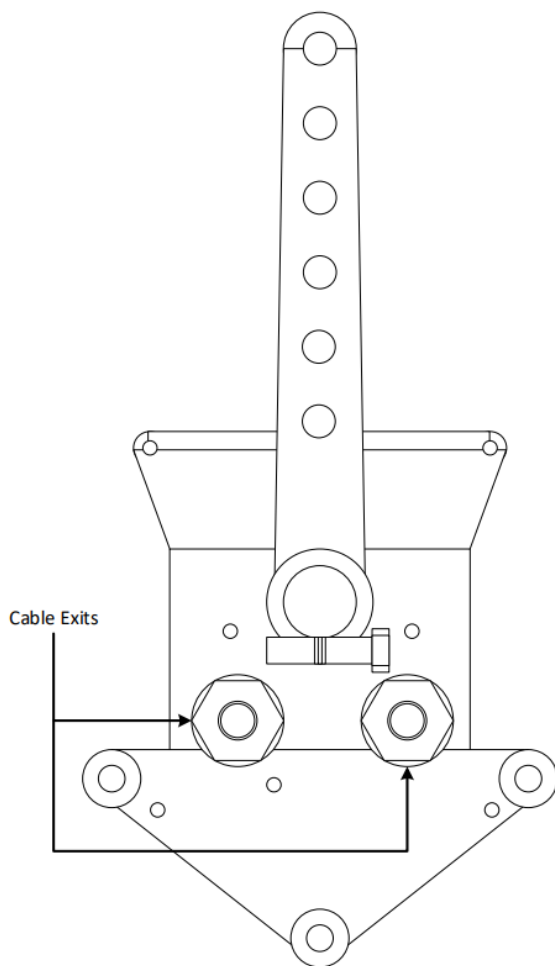
The product's 3C/18AWG electrical cable contains the following wires and related functions:

Table 2: 7168 Wire Connections

7168				
Wire #	Wire Name	Colour	Gauge	Function
1	POT+	White	18AWG	FFU potentiometer power supply connection.
2	POT WIPER	Red	18AWG	FFU potentiometer signal connection.
3	POT-	Black	18AWG	FFU potentiometer ground connection.

The cable penetration location is shown in Figure 2: 7168 Cable Penetration Location and the internal wire connections are shown in Figure 3: 7168-P Internal Wiring Diagram and Figure 4: 7168-PP Internal Wiring Diagram respectively.





*Figure 2: 7168 Cable Penetration Locations*

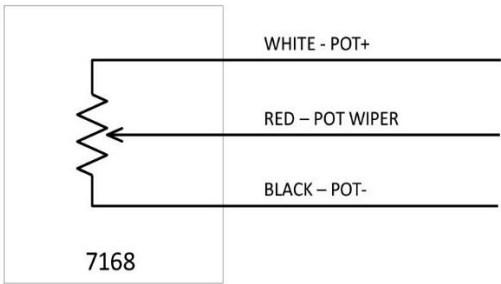


Figure 3: 7168-P Internal Wiring Diagram

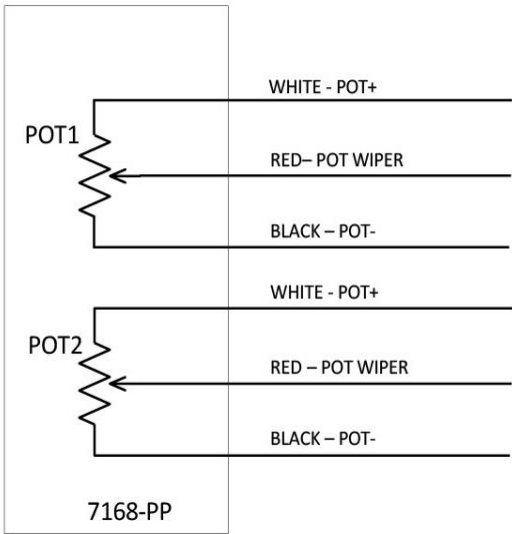


Figure 4: 7168-PP Internal Wiring Diagram

The operating direction of the Potentiometer in relation to the Rudder Feedback Unit handle is shown in Figure 5.

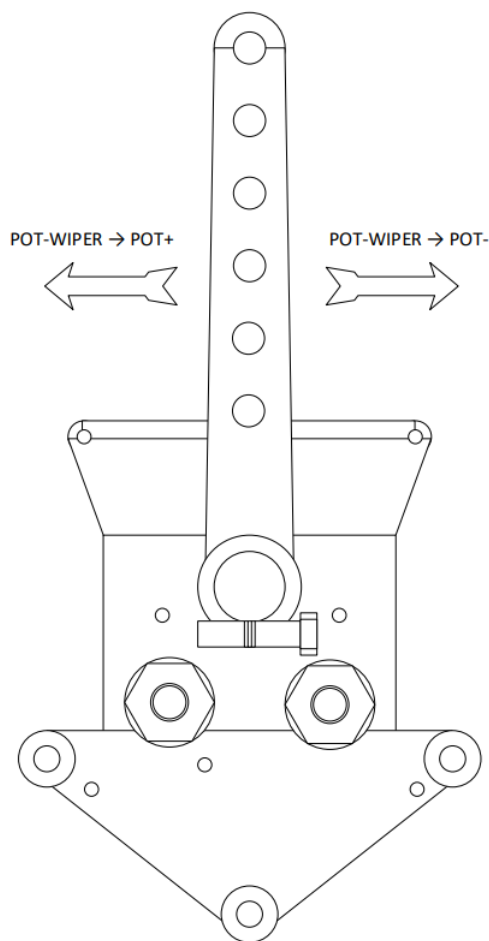


Figure 5: 7168 Potentiometer Direction Diagram – Bottom View

#### 4.2.1 Oil Filling

For 7168-PP-O oil filled models, transformer oil is used to isolate and protect the electrical infrastructure of the rudder feedback unit. Fill the unit with approximately 12 cubic inches [0.2 l] of transformer oil. The [Maintenance section](#) of this manual list several approved brands in a table.

## 5 COMMISSIONING

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### 5.1 ELECTRICAL CHECK



#### CAUTION

Ensure that the rear cover is installed and secured before powering on the 7168.

- Confirm that the electrical connections to the 7168 have been made.

### 5.2 FUNCTIONAL TEST



#### CAUTION

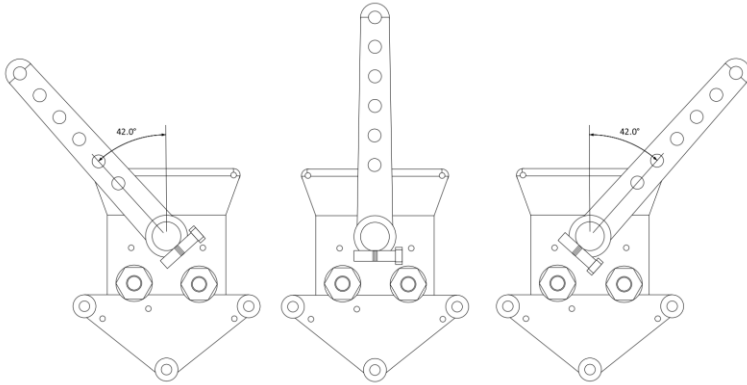
The Functional Test should be carried out while the vessel is still at dock and before it is taken out to sea after installation has been completed.

A complete functional test should be performed on the system that the Rudder Feedback Unit has been installed within before entering operational use.

- Ensure the range of motion suits the PORT to STBD range required by your system installation.
- Ensure that the linkage has been properly installed between the RFU and the Rudder Stock.
- Ensure correct end-to-end connection of all related wiring.
- Perform a functional test of all hardware.

## 6 OPERATION

The Kobelt 7168 Rudder Feedback Unit contains up to two potentiometers. The arm of the Rudder Feedback Unit is mechanically linked to the rudder and has a span of 42 degrees in both directions. Movement of the rudder adjusts the internal potentiometer. The range of the 7168 Rudder Feedback Unit during operation is shown below.



*Figure 6: 7168 Positions of Operation, LEFT - CENTRE - RIGHT*

## 7 MAINTENANCE

### 7.1 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.
- Every (2) two years
  - Confirm all electrical screw terminals are secured.
  - Conform cable glands are secured to cables.
- Every (1) year for 7168-PP-O models
  - Transformer oil, used to insulate the electrical infrastructure of the Rudder Feedback Unit, may need replenishing. Four recommended brands are shown below in Table 3.

*Table 3: Transformer Oil Brands*

Approved Brands
Petro Canada Luminol
Phillips 66 Lubricants
Q8 Oils
Total Energies

### 7.2 RECOMMENDED SPARE PARTS

No spare parts are recommended for this unit due to the sealed nature of its design.

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.

# 8 TROUBLESHOOTING

If you encounter problems with the operation of your product, please refer to the trouble-shooting 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.	1. Check system wiring. 2. Confirm wiring to Rudder Feedback Unit.
	Broken potentiometer or contact.	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.

## 9 WARRANTY

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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 3<sup>rd</sup> party manufacturing companies. However, these products and parts are subject to applicable 3<sup>rd</sup> party warranties and may not be the same as the Kobel warranty.



# 10 MANUAL REVISIONS HISTORY

Table 5: Table of revision changes

Document Revision	Release Date	ECN	Author	Revision Summary
C	2023-12-27	00950	SV	<ul style="list-style-type: none"><li>Changed the wire in potentiometer to shielded type (from Green to Red) P8 in table 2, and P10 in Figure 3 &amp;4</li></ul>

## 11 APPENDIX A: INSTALLATION DIMENSIONS

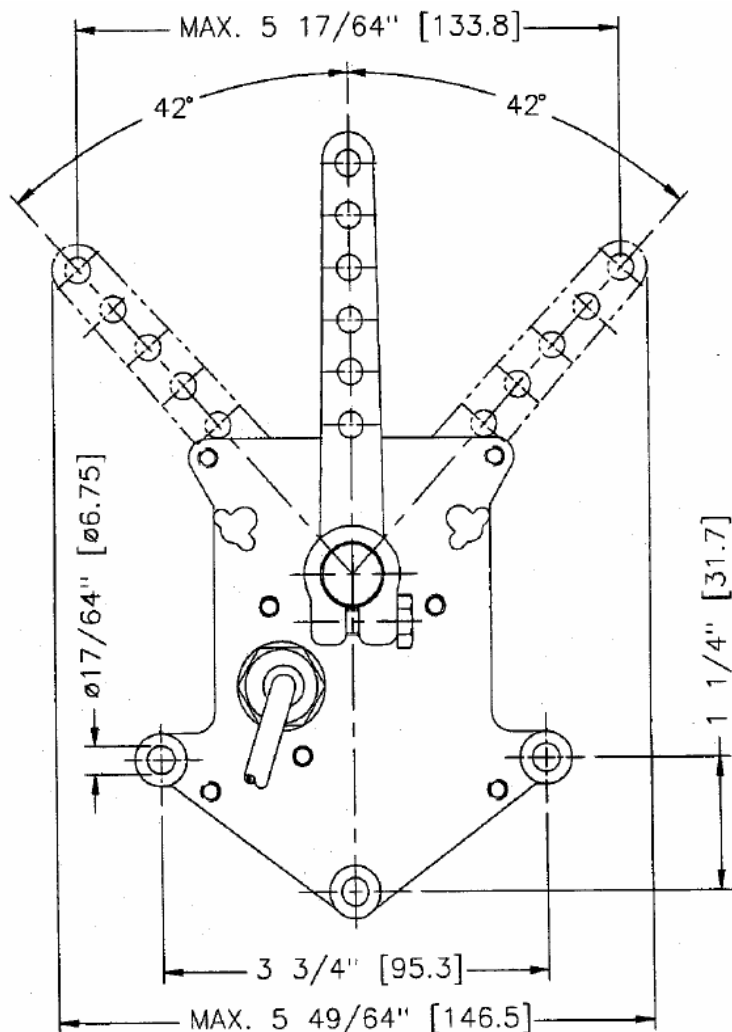


Figure 7: 7168 Installation Dimensions – Bottom View

12 APPENDIX B: PARTS LIST

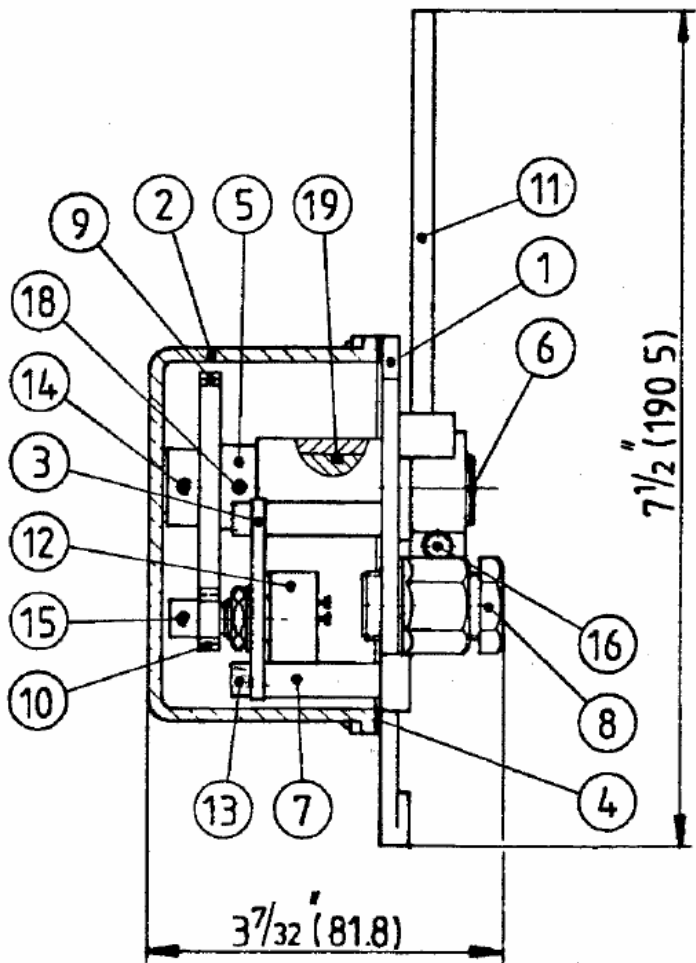




Figure 8: 7168 Parts Diagram

Table 6: 7168 Parts List

Model No. 			7168	
Part No. 			7168-P	7168-PP
ITEM	QTY	DESCRIPTION		
1	1	Frame	7168-0001	
2	1	Cover	7168-0002	
3	1	Plate	7168-0003	
4	1	Gasket	7168-0004	
5	1	Bushing	7168-0005	
6	1	Shaft	7168-0006	
7	3	Spacer	7174-0008	
8	1*	Gland	6001-0248	
9	1	Spur Gear	YPB-3264	
10	1*	Gear	Y-3216	
11	1	Lever	2104-0006	
12	1*	Potentiometer – 1K	POT-1	
13	3	Hex Socket Hd Cap Screw	1002-0822	
14	1	Hex Socket Set Screw	1016-0804	
15	1*	Hex Socket Set Screw	1016-0602	
16	1	Hex Hd Cap Screw	1001-0814	
17	4	Round Hd Philips Screw	1010-0806	
18	2	Spring Pin	1024-0512	
19	1	"O" Ring	1101-0014	

\* Note: The following quantities are 2 for the 7168-PP variant.

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