

KOBELT

7180 Rudder Angle Indicator

Owner's Operation, Installation & Maintenance Manual



March 2022

Kobel Manufacturing Co. Ltd.

TABLE OF CONTENTS

| | | |
|-----------|--------------------------------------------------------|-----------|
| 1 | Introduction | 4 |
| 1.1 | Contact | 4 |
| 1.2 | Safety | 4 |
| 2 | Product Description | 6 |
| 2.1 | Technical Data | 7 |
| 3 | Operation | 8 |
| 4 | Installation | 9 |
| 4.1 | Mechanical | 9 |
| 4.2 | Electrical | 10 |
| 5 | Commissioning | 16 |
| 5.1 | Electrical Check | 16 |
| 5.2 | Calibration and Adjustment | 16 |
| 5.3 | Functional Test | 18 |
| 6 | Maintenance | 19 |
| 6.1 | Preventative maintenance | 19 |
| 6.2 | Recommended Spare Parts | 19 |
| 7 | Troubleshooting | 20 |
| 8 | Warranty | 21 |
| 9 | Appendix A: Installation Dimensions | 22 |
| 10 | Appendix B: Installation Cut-Out Template | 23 |

1 INTRODUCTION

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.

Kobel 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 SAFETY

1.2.1 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. |

1.2.2 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.

1.2.3 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 the product variant. Failure to do so could result in damage or fire. |
| NOTICE | Remove Shipping Clip: Remove protection clip used for shipping found between terminal posts before applying power to unit. |
| NOTICE | Disassembly and repair of this electronic unit should only be performed by authorized service personal. Any modification of the serial number or attempt to repair the original equipment or accessories by unauthorized individuals will void the warranty. |

2 PRODUCT DESCRIPTION

The 7180 Rudder Angle Indicator is a smaller version of the popular Kobelt 7175 Rudder Angle Indicator. The 7180 is available in Master and Slave configurations in both 12 VDC and 24 VDC offerings. Both the Master and Slave contain a backlight to illuminate the indicator during dark operating hours.

The 7180 Rudder Angle Indicators will provide you with real-time visual display of the position of your rudder while your vessel is underway. Whether you are manoeuvring, or your autopilot is commanding your vessels, an accurate readout of your rudder position will be displayed on this tri-colour two-inch diameter display indicator.

The unit indicates the PORT direction of travel in Red and the STBD direction of travel in Green for easy and quick identification while steering. The system supports one Master Indicator with up to a maximum of 5 Slave Indicators (or “repeater stations”) commanded by a single input signal. The indicators are driven by a position transducer such as the Kobelt 7163, 7168, or 7174 Rudder Feedback Units (RFU).

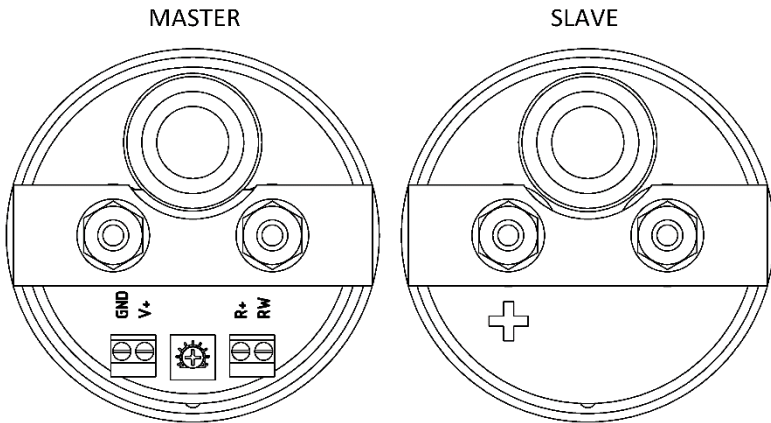


Figure 1: Master and Slave Unit Back Views

2.1 TECHNICAL DATA

Table 1: 7180 Technical Data

| MODEL | 7180 SERIES | | | |
|-----------------------------------|----------------------------------|-----------|--------|-----------|
| KOBELT P/N: | 7180-M | 7180-M-24 | 7180-S | 7180-S-24 |
| NOMINAL VOLTAGE | 12 VDC | 24 VDC | 12 VDC | 24 VDC |
| MAXIMUM CURRENT, METER | 20 mA | 40 mA | -- | |
| RECOMMENDED DRIVING POTENTIOMETER | 1k Ω | | -- | |
| MAXIMUM NUMBER OF SLAVE UNITS | 5 | | -- | |
| FACE DIAMETER | 2" | | | |
| ILLUMINATION BULB TYPE | T3-1/4 Wedge Type | | | |
| MAXIMUM CURRENT, BULB | 330 mA | 60 mA | 330 mA | 60 mA |
| PROTECTION, TOP SIDE EXPOSURE | IP56* | | | |
| PROTECTION, BOTTOM SIDE EXPOSURE | IP20 | | | |
| MAXIMUM DASH THICKNESS | 3/4" [19mm] | | | |
| OPERATING TEMPERATURE | -13°F ... 158°F [-25°C ... 70°C] | | | |
| PRODUCT WEIGHT | 0.55 lb. [0.25kg] | | | |
| EMC/EMI STANDARD | IEC: 60945 | | | |
| COMPASS-SAFE DISTANCE | 51cm [20.07 in.] | | | |

* Requires an o-ring between the meter and the dash surface.

3 OPERATION

The 7180 Rudder Angle Indicator system requires no direct user input to function. The system is passive and responds to signals from a Rudder Feedback Unit or alternative signal sources such as control levers. The signal commands the needle position on the Indicator. This position can be calibrated to correspond to physical rudder position or the position of an alternative signal source.

A single master unit can drive up to 5 slave units. The slave units directly follow the meter movement of the master. Span configuration is done on the master unit. Zero adjustment is available on both the master and slave units.

If a backlight dimmer is installed in the system, the operating instructions of the dimmer manufacturer/installer shall be followed for adjustment of the dimmer.

4 INSTALLATION

4.1 MECHANICAL

All meter variants contain the same physical properties and dimensions. The gauge meters are to be installed using a 2.1" round hole in the desired panel or dash location on the vessel (refer to Appendix B: Installation Cut-Out Template, for a mounting template).

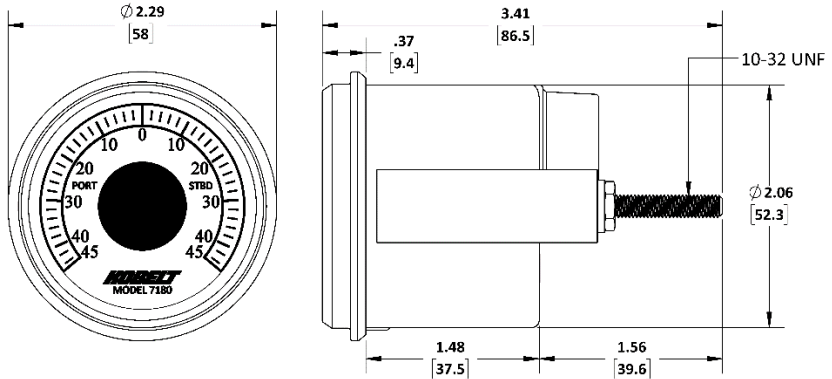


Figure 2: Mechanical Dimensions

NOTICE

Ensure proper clearance is provided behind the panel or dash installation location to allow for securing the tightening clamps to hold the unit securely.

4.1.1 Mounting

A pre-installed bracket and fasteners are included with 7180 gauges for mounting the units.

1. Loosen and remove nuts holding brace to unit.
2. Remove brace completely from unit.
3. Place the o-ring around the unit
4. Insert unit into cut-out hole in the mounting location.
5. Replace the brace on the back-side of the unit.
6. Replace the nuts and tighten to secure the unit to the mounting location.

NOTICE

Ensure that the terminals are properly isolated, by the isolating washers that separate the terminals from the mounting brace, before powering on the unit.

NOTICE

Do not over tighten the mounting brace as it may cause the needle not to rotate.

4.2 ELECTRICAL

The 7180 gauges support a nominal supply voltage of either 12VDC or 24VDC. The supply voltage to the meter is isolated from the supply voltage used for the illumination. This isolation allows the illumination to be powered from a separate power source or connected to a common dimming control circuit for all dash mounted instruments.

The unit contains a T3-1/4 Miniature Wedge Base incandescent bulb holder with a 12 VDC or 24 VDC bulb pre-installed as per the model ordered.

CAUTION

A circuit breaker of 2A is recommended between the vessel power supply source and the indicator(s) as shown in the example installation diagrams.

NOTICE

Class vessels require light bulbs to be dimmable. To achieve this, a 250 Ω potentiometer can be used.

NOTICE

All terminal wire connections to the meter should use crimped ring or ferrule terminals, as appropriate, to ensure a secure connection for high-vibration environments.

Control signals shown in the following figures are provided by standard control levers. Please review the Kobelt website for all options available.

Electrical installation of the 7180 should proceed as follows:

WARNING

Disconnect Power: Turn off power at distribution panel before beginning installation to protect installer from electrical hazards.

NOTICE

Proper Electrical Polarity: Damage to the indicator can occur if input voltage connection is reversed. Ensure proper connection of the Positive and Negative terminals.

1. Connect electrical cables and power wires according to one of the configurations shown in Figure 4 through Figure 6, and the additional details in this section of the manual.
 - a. Verify supply breaker (or fusing) is correctly sized as per specifications in Table 1.
 - b. Verify wires and cables used are of the required gauge sizes and types as per local marine regulations and standards.

2. Visually inspect all wiring to ensure correct installation.

NOTICE

Remove Shipping Clip: Remove protection clip used for shipping found between terminal posts before applying power to unit.

4.2.1 Electrical Interfaces

The backside of the Master and Slave units contain the electrical connections for wiring of the system. The Master and Slave units contain different wiring terminals and identifiers. Refer to designators shown in Figure 3.

Table 2: Master Gauge Backside Connections

| Master Gauge | | |
|----------------|----------|------------------------------------------------------------------------------------|
| Pin Designator | Pin Type | Function |
| GND | Power | Power Supply Common connection point. |
| V+ | Power | Power Supply Source. Accepts either 12VDC or 24VDC. |
| R+ | Output | Supplies power to the positive terminal of the Rudder Feedback Unit potentiometer. |
| RW | Input | Receives feedback signal from the Rudder Feedback Unit potentiometer. |

Table 3: Slave Gauge Backside Connections

| Slave Gauge | | |
|----------------|----------|---------------------------------------------|
| Pin Designator | Pin Type | Function |
| + | Input | Input current loop signal from Master unit. |
| (blank) | Output | Output current loop signal from Slave unit. |

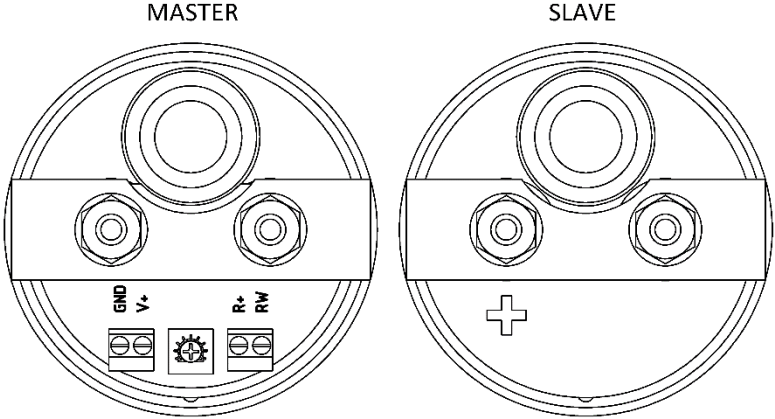


Figure 3: Master and Slave Unit Connector Views

4.2.2 Master Unit Configuration

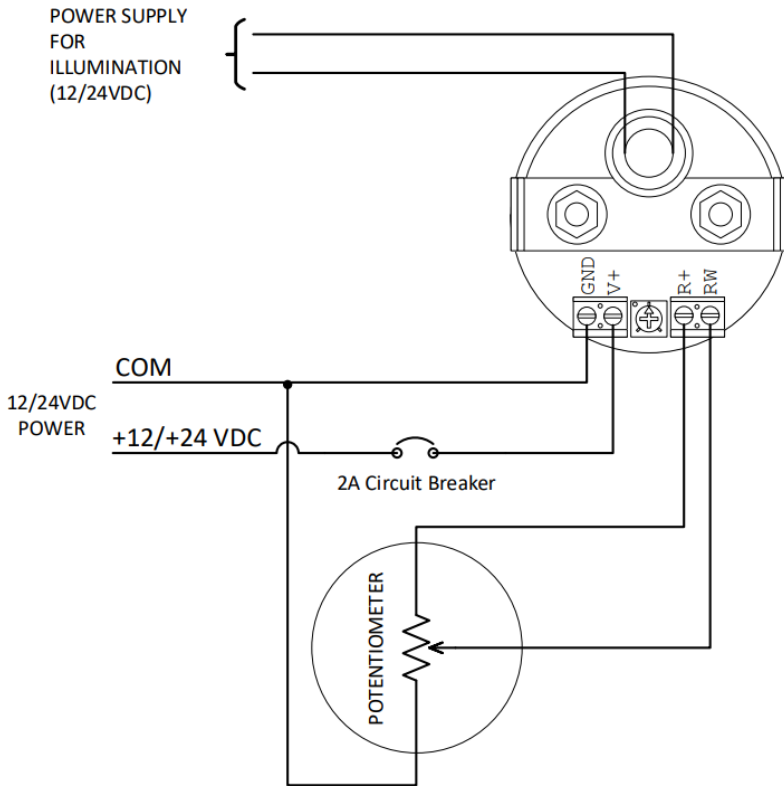


Figure 4: Master Unit Configuration

4.2.3 Master and Single Slave Unit Configuration

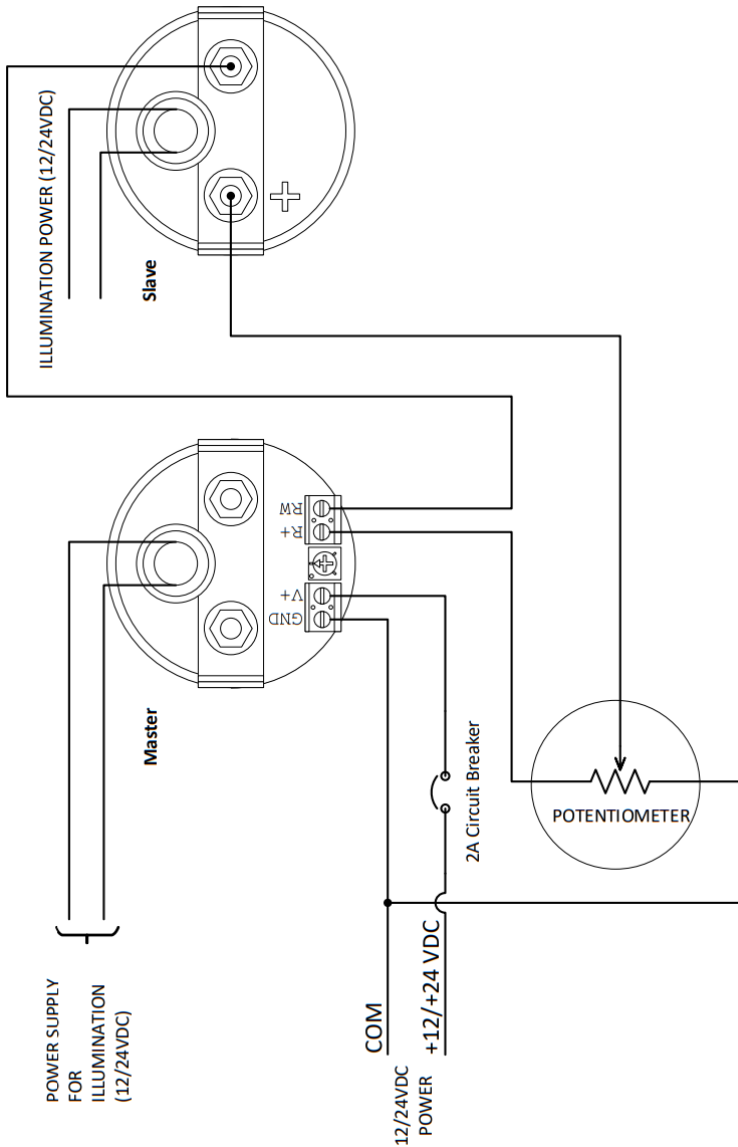


Figure 5: Master and Single Slave Unit Configuration

4.2.4 Master and Multiple Slave Units Configuration

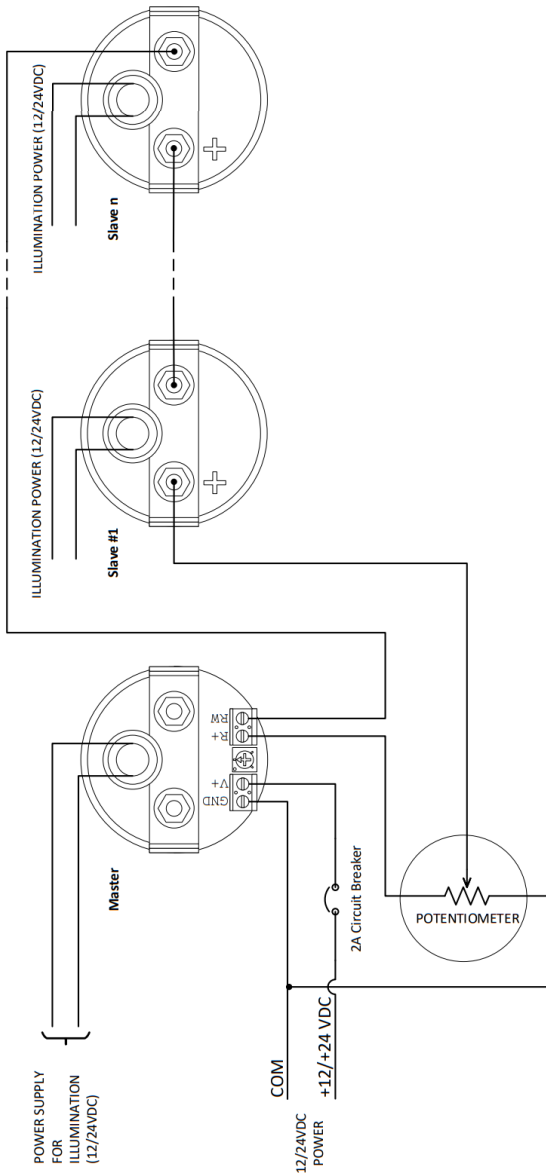


Figure 6: Master and Multiple Slave Units Configuration

5 COMMISSIONING

5.1 ELECTRICAL CHECK



CAUTION

Ensure that the unit is properly installed and secured before powering on the 7180.

- Confirm that all electrical connections to the 7180 have been made.
- Confirm that a breaker has been installed correctly and is turned ON.

5.2 CALIBRATION AND ADJUSTMENT

The gauge may need to be adjusted to centre the pointer when the rudder is centred and to adjust the overall range of the meter to align with the position of the rudders maximum travel.

Follow these instructions to configure the zero point and span using the on-board zeroing lever and trimpot.

SAFETY INSTRUCTIONS

To reduce the potential for electrical shock and to avoid damaging the 7180 electronics, **use a non-conductive screwdriver**, or other equivalent tool, to adjust the trimpot or zeroing lever.

Exercise caution when reaching in with the screwdriver. Do not let it touch any components other than the trimpots.

NOTICE

Ensure no oil, dust, or other contamination enters the 7180 while its cover is removed.

1. Turn OFF power to the 7180 prior to making adjustment.
2. If adjusting the zeroing lever, remove the red plug or lightbulb, if installed.
3. Use a **non-conductive** flathead or Phillips-head screwdriver to adjust the trimpot or zeroing lever.
 - a. Refer to the sections below for functional details of the trimpot and zeroing lever
4. Turn ON power.
5. Move rudder through its range to verify desired response.
6. Repeat as necessary, until the 7180 functions as desired.
7. Replace the red plug or lightbulb, if installed.

Default position for the configuration trimpot is at centre (pointing upward).

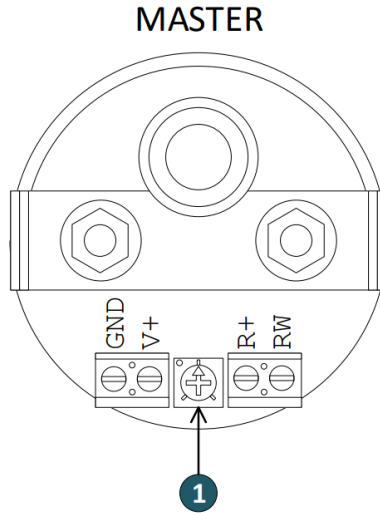


Figure 7: Master Unit Calibration Trimpot Arrangement

5.2.1 1 Span Trimpot

The span trimpot adjusts the range of the meter when slave units are added in series.

NOTICE

Do not press down on the potentiometer as this can damage the circuitry.

5.2.2 Zero Adjustment

The zero-adjustment lever is located inside the lightbulb cavity and can be accessed by removing the red plug or the lightbulb, if installed. The zero point is adjusted by moving the small lever inside the meter. Calibration of the zero point should be done when the rudder is at dead-center.

**NOTICE**

Zero adjustment should be done by qualified personnel only.

5.3 FUNCTIONAL TEST

Before commencing normal operations with the installed unit(s). A functional test should be conducted to ensure proper operation of the system as per the intended application and configuration.

NOTICE

Functional testing should be done by qualified personnel only. The system functionality should be fully tested dockside before an open water sea trial is performed to ensure proper response of the system based on rudder commands.

After installation perform the following function tests:

1. Center the rudder
 - a. Ensure that the meter displays 0°. If not, adjust the zero lever until it is centered at 0°
2. Move the rudder to hard-over
 - a. Ensure that the meter displays the hard-over angle. If not, adjust the 'Span' trimpot until it is at the correct angle.

6 MAINTENANCE

6.1 PREVENTATIVE MAINTENANCE

- Quarterly (4 times per year)
 - Visually inspect all wire connections for signs of wear.
- Every year
 - Inspect top and internal enclosure to ensure no adverse wear due to environment.
 - Confirm all electrical connections are secure.
 - Ensure calibration and zero point of unit.

6.2 RECOMMENDED SPARE PARTS

As a minimum Kobelt recommends the following spare parts are on-hand:

Table 4: Recommended Spares

| RECOMMENDED SPARES | | |
|--------------------|-------------------------------------|---------------|
| QTY | ITEM | KOBELT PART # |
| 1 | T3-1/4 BULB, 24V* (ANSI Model: 656) | 6001-3647 |
| 1 | T3-1/4 BULB, 12V* (ANSI Model: 193) | 6001-3633 |

* Select the spare bulb based on the desired operating voltage.

NOTICE

It is recommended that any required service work on a Kobelt unit 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 5: Common Solutions

| Problem (Issue encountered) | Cause (What it means) | Corrective Action (What to do) |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 7180 indicator(s) not operational | Blown fuse/circuit breaker | Check and replace fuse or reset circuit breaker |
| | Wiring issue | Check for proper wiring |
| 7180 unit does not illuminate | Lightbulb not correctly installed | Check the lightbulb installation and ensure that all connections have been properly made. |
| | Dimming is turned down all the way (if installed) | Adjust the dimming knob (if installed) until the 7180 unit is adequately illuminated. |
| Master indicator moves in opposite direction to rudder | Potentiometer power wires are reversed | Reverse the wiring at the positive and negative terminals of the potentiometer. Correct the wiring following the examples in Section 0. |
| Slave indicator moves in opposite direction to rudder | Input wires are reversed | Reverse the wiring at the input terminals of Slave. Correct the wiring following the examples in Section 0. |
| Port and Starboard hard-over are not equal | Rudder angle feedback unit (or alternative source) is not installed or adjusted properly | Confirm correct installation and adjustment of the rudder angle feedback unit (or alternative source). |
| Indicator(s) movement not in sequence with rudder movement | Scale range is uncalibrated | Adjust span trimpot as described in Section 5.2 to adjust scale. |
| Indicator(s) reading is not correct with slave units installed | Span trimpot needs adjustment | Adjust span trimpot as described in Section 5.2 |
| Rudder center angle does not read zero | Zero adjustment is required | Adjust zeroing lever as described in Section 5.2 |
| Rudder Angle Needle does not rotate | Rudder angle enclosure bracket is too tight | Slightly Loosen the mounting brace to allow the needle to freely rotate |

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

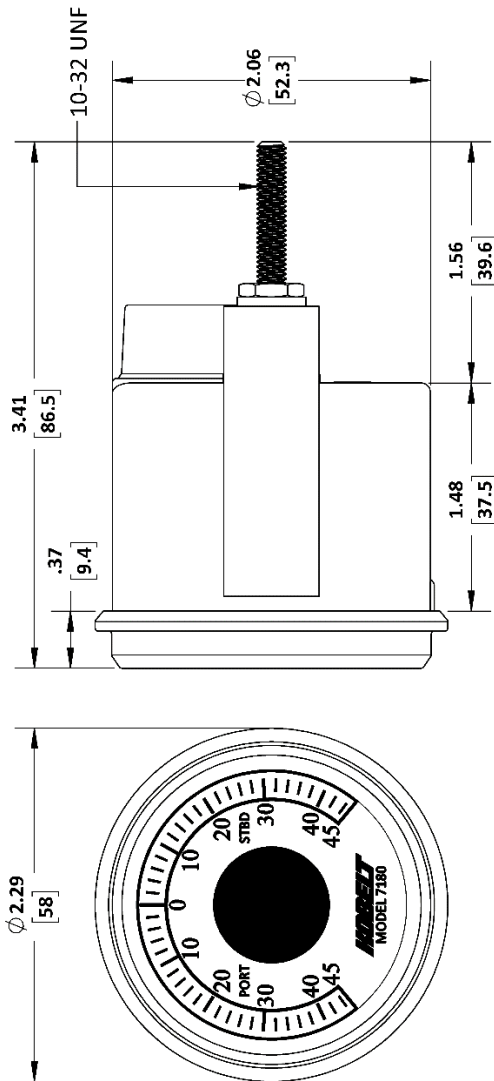


Figure 8: Mechanical Dimensions of 7180

10 APPENDIX B: INSTALLATION CUT-OUT TEMPLATE

NOTICE

Scale may not be exactly 1:1 due to PDF and printer scaling settings. Verify primary dimension with a ruler after printing and before using to cut.

CUT HERE

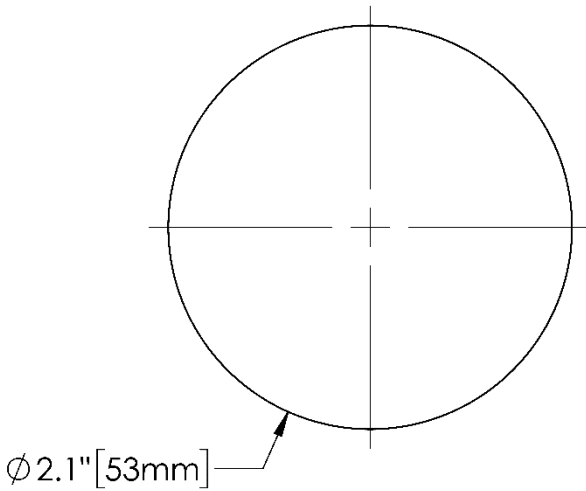


Figure 9: Installation Cut-out Template

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