

KOBELT

7175 Analog Indicators: Rudder Angle, Rudder Order and Propeller Pitch

Owner's Operation, Installation & Maintenance Manual



April 2023

Kobel Manufacturing Co. Ltd.

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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.

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 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	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 7175 Analog Indicators product line consists of a range of gauges to display rudder angle position, rudder order command, and propeller pitch at your vessel's control stations. The product line consists of both Master and Slave back-lit gauges providing a variety of monitoring solutions to suit the configuration requirements. The indicators are driven by a position transducer such as the Kobelt 7163, 7168, or 7174 Rudder Feedback Units (RFU).

The 7175 product line consists of the following products:

Table 1: Product Family

KOBELT PART #			
DESCRIPTION	MASTER UNIT	SLAVE UNIT	FACE STYLE
Rudder Angle	7175-MZ	7175-SZ	A
Rudder Angle (Reversed)	--	7175-SRZ	B
Rudder Order	7175-HMZ	7175-HSZ	C
Propeller Pitch	7175-PMZ	7175-PSZ	D

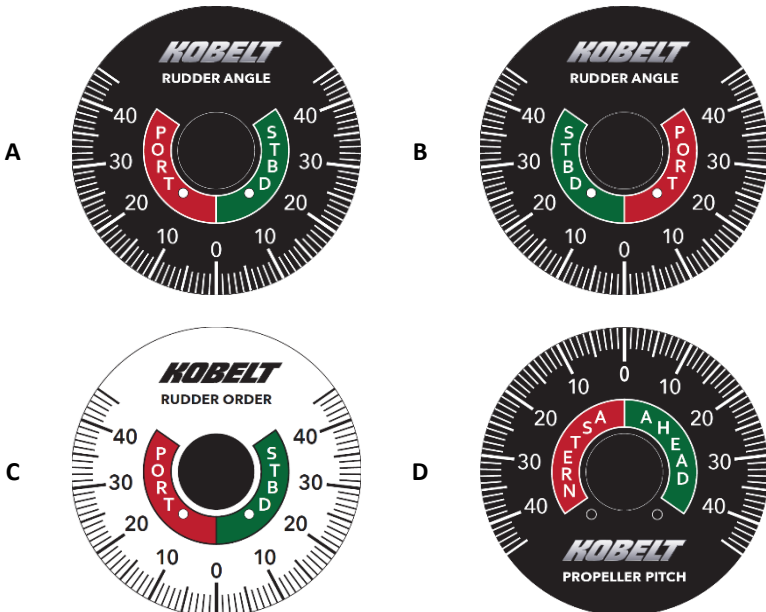


Figure 1: Face Styles

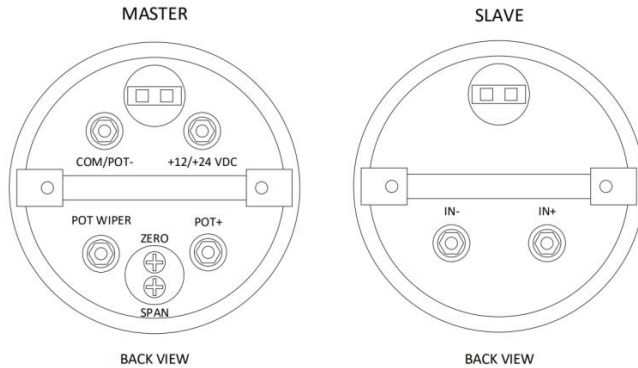


Figure 2: Master and Slave Unit Back View

2.1 TECHNICAL DATA

Table 2: 7175 Technical Data

MODEL	7175 SERIES	
KOBELT P/N:	7175-MZ, 7175-HMZ, 7175-PMZ	7175-SZ, 7175-SRZ, 7175-HSZ, 7175-PSZ
NOMINAL VOLTAGE	24 VDC / 12 VDC	--
VOLTAGE RANGE	10.8-31.2 VDC	
MAXIMUM CURRENT, METER	20 mA	--
PROTECTION, TOP SIDE EXPOSURE	IP56	
PROTECTION, BOTTOM SIDE EXPOSURE	IP20	
OPERATING TEMPERATURE	-4°F ... 131°F [-20°C ... 55°C]	
STORAGE TEMPERATURE	-22°F ... 158°F [-30°C ... 70°C]	
PRODUCT DIMENSIONS (WIDTH x DEPTH x HEIGHT)	3.8" x 3.1" x 3.8" [96 mm x 78 mm x 96 mm]	
PRODUCT WEIGHT	0.9 lbs [0.4 kg]	
RECOMMENDED DRIVING POTENTIOMETER	1kΩ	--
MAXIMUM NUMBER OF MASTER UNITS	1	
MAXIMUM NUMBER OF SLAVE UNITS	5	
MOVEMENT ACCURACY	± 1.5°	
MOVEMENT RANGE	± 45°	
ILLUMINATION BULB TYPE	T3-1/4 Wedge Type	
MAXIMUM CURRENT, BULB	60 mA / 190 mA	60 mA / 190 mA
COMPASS-SAFE DISTANCE	2cm [0.79 in.]	
EMC/EMI STANDARD	IEC: 60945	
IP RATING ¹	IP56	

- Notes: Above the console. IP20 below.

2.2 RETIRED MODELS OF 7175 INDICATORS

NOTICE

The new 7175 Analog Indicators product line is a replacement for retired 7175 Analog Indicator models.

The new products are backwards compatible with the retired products however care should be taken during installation and configuration as small variances between the products may exist.

PRODUCT DESCRIPTION	ACTIVE PART NUMBER (Z SERIES)	RETIRED PART NUMBERS
Master Rudder Angle Indicator	7175-MZ	7175-MY-(vb) 7175-MY-24-(vb) 7175-MY-24 7175-M 7175-MY 7175-MA 7175-BMX 7175-BMA
Slave Rudder Angle Indicator	7175-SZ	7175-SY-(vb) 7175-SY-24 7175-S 7175-SY 7175-SX 7175-SA 7175-BSA
Slave Ruder Angle Indicator (Reversed)	7175-SRZ	7175-SRY 7175-SRX 7175-SRA
Master Rudder Order Indicator	7175-HMZ	(NONE)
Slave Rudder Order Indicator	7175-HSZ	(NONE)
Master Propeller Pitch Indicator	7175-PMZ	7175-PMY 7175-PMA
Slave Propeller Pitch Indicator	7175-PSZ	7175-PSY 7175-PSA
Master Propeller Pitch Indicator (Reversed)	NOT OFFERED	7175-PMRY
Slave Propeller Pitch Indicator (Reversed)	NOT OFFERED	7175-PSRY
Replacement Lamp Holder	7175-0102	7175-0001 (A SERIES) 7175-0002 (Y SERIES)

3 INSTALLATION

3.1 MECHANICAL

All meters contain the same physical properties and dimensions. Refer to Appendix A: Installation Dimensions for physical dimensions.

The gauge meters are to be installed using a 3-3/8" round hole in the desired panel or dash location on the vessel (refer to Appendix B: Installation Cut-Out Template for detailed mounting 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.

3.1.1 Mechanical Mounting

Fasteners are provided with the gauge for mechanical and electrical mounting. Refer to Figure 3: 7175 Exploded Fastener View for recommended configuration.

1. Remove nuts and braces from the fastener package.
2. Insert unit into cut-out hole in the mounting location.
3. Install the braces on the back-side of the unit.
4. Replace the nuts and tighten to secure the unit to the mounting location.

NOTICE

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

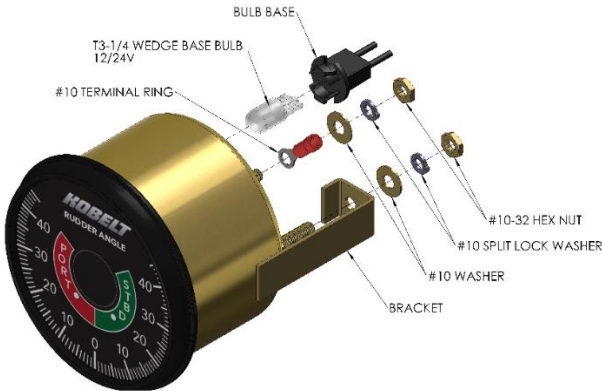


Figure 3: 7175 Exploded Fastener View

3.2 ELECTRICAL

NOTICE

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

3.2.1 Power

The 7175 gauges support a nominal supply voltage of either 12VDC or 24VDC. Use a regulated, clean, and reliable source to power the 7175 gauges. Circuits with large inductors present, such as cooling fans are not recommended as high voltages are produced during switching. If issues arise with the power supply, consider installing a surge suppressor, such as Phoenix Contact's TT-SLKK5/24VDC varistor. A power conditioner, DC-DC isolation, or similar devices provide even better isolation, but at a greater cost.

NOTICE

Failure to isolate the panel meter from voltage surges may result in the meter shutting down and requiring a power reset.

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.



CAUTION

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

The 7175 gauges are protected from over-voltage events that may damage the device. In the event of an over-voltage the meter will shut off to protect itself from damage. Power must be cycled to restore operation.

3.2.2 Electrical Connection

The unit contains a T3-1/4 Miniature Wedge Base incandescent bulb holder with a 24VDC bulb pre-installed. If required, an additional bulb is available in the shipping package for use with 12VDC. To install, remove the 24VDC bulb with a twisting action and replace with the 12VDC bulb.

NOTICE

Class vessels require light bulbs to be dimmable. To achieve this, a 250 Ω potentiometer can be used, shown in Figure 8.

Rudder Feedback Unit signals shown in the following figures are provided by standard Kobelt RFUs. Please review the Kobelt website for all RFU options available.

Electrical installation of the 7175 should proceed as follows:



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

NOTICE

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

NOTICE

Electrical Cables: All cables used must be shielded conductors to adhere to IEC:60945 standards

1. Wire electrical cables and power wires, according to one of the configurations shown in Figure 5 through Figure 7 and the additional details in this section of the manual.
 - a. Verify supply breaker (or fusing) is correctly sized as per specifications table.
 - 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 is correctly installed.

3.2.3 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.

Table 3: Master Gauge Backside Connections

Master Gauge		
Pin Designator	Pin Type	Function
+12/+24 VDC	Power	Power Supply Source. Accepts either 12VDC or 24VDC nominal voltage.
COM/POT-	Power	Power Supply Common connection point.
POT+	Output	Supplies power to the positive terminal of the Rudder Feedback Unit potentiometer.
POT WIPER	Input	Receives feedback signal from the Rudder Feedback Unit potentiometer.

Table 4: Slave Gauge Backside Connections

Slave Gauge		
Pin Designator	Pin Type	Function
IN+	Input	Input current loop signal from Master unit.
IN-	Output	Output current loop signal from Slave unit.

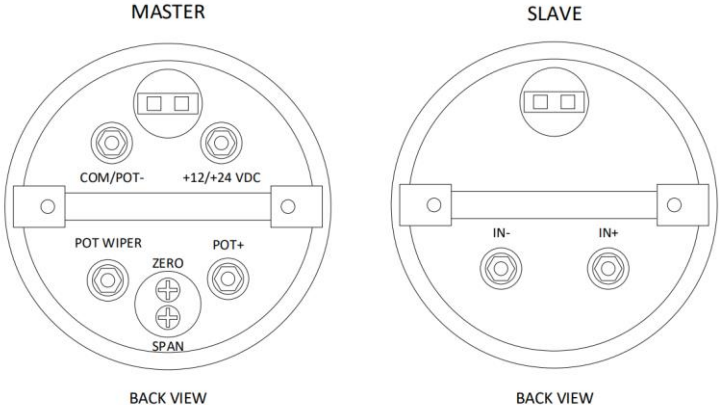


Figure 4: Master and Slave Unit Connector Views

3.2.4 Master Unit Configuration

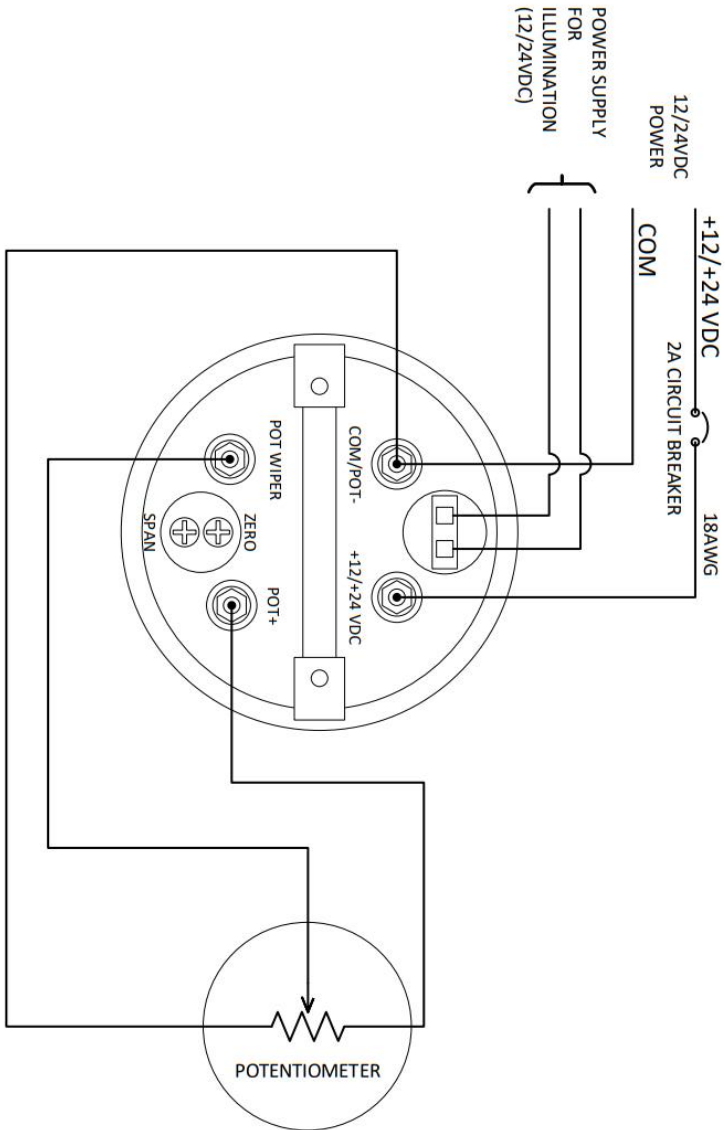


Figure 5: Master Unit Configuration

3.2.5 Master and Single Slave Unit Configuration

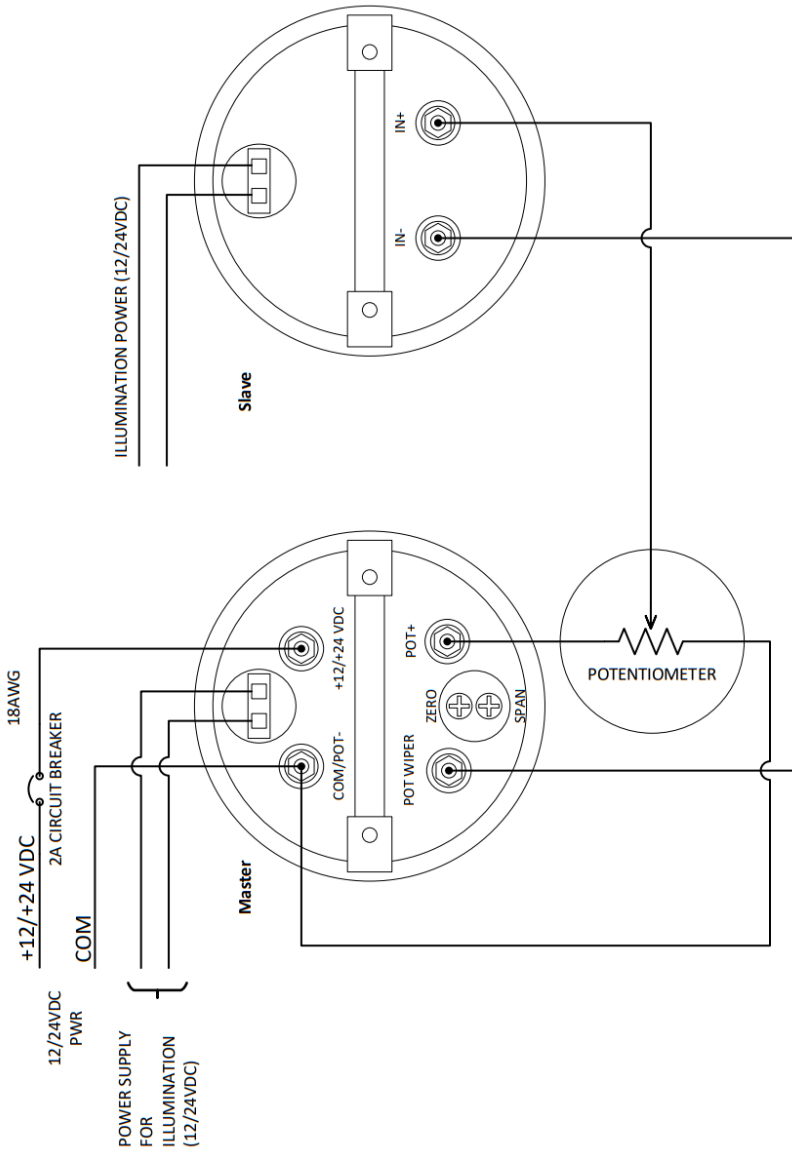


Figure 6: Master and Single Slave Unit Configuration

3.2.6 Master and Multiple Slave Units Configuration

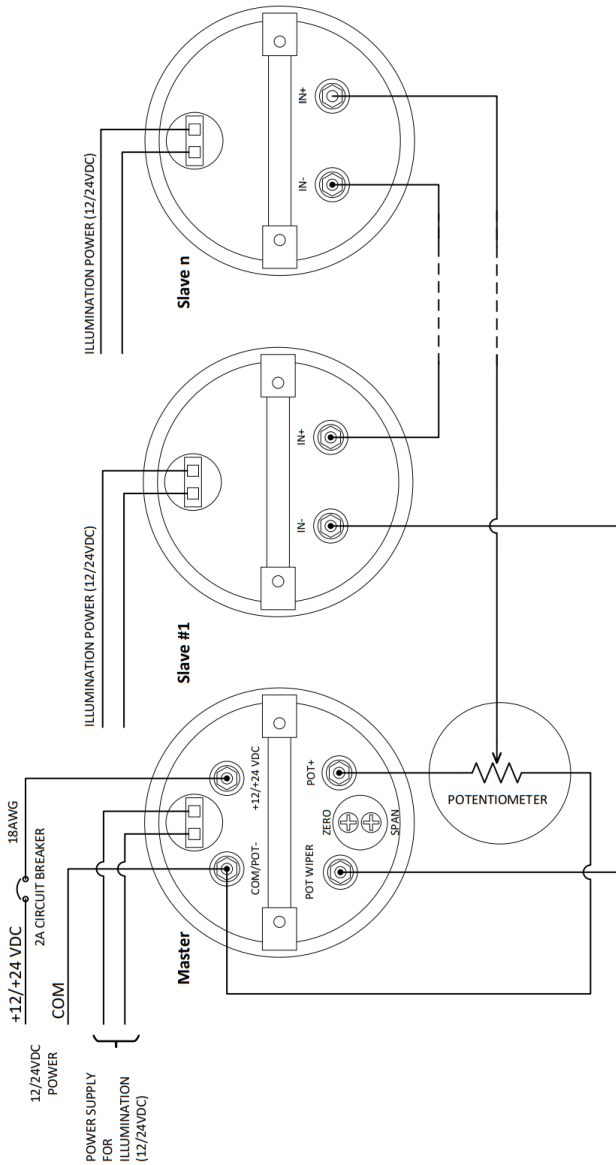


Figure 7: Master and Multiple Slave Units Configuration

3.2.7 Dimming Potentiometer

NOTICE Similar configuration will be used for slave units.

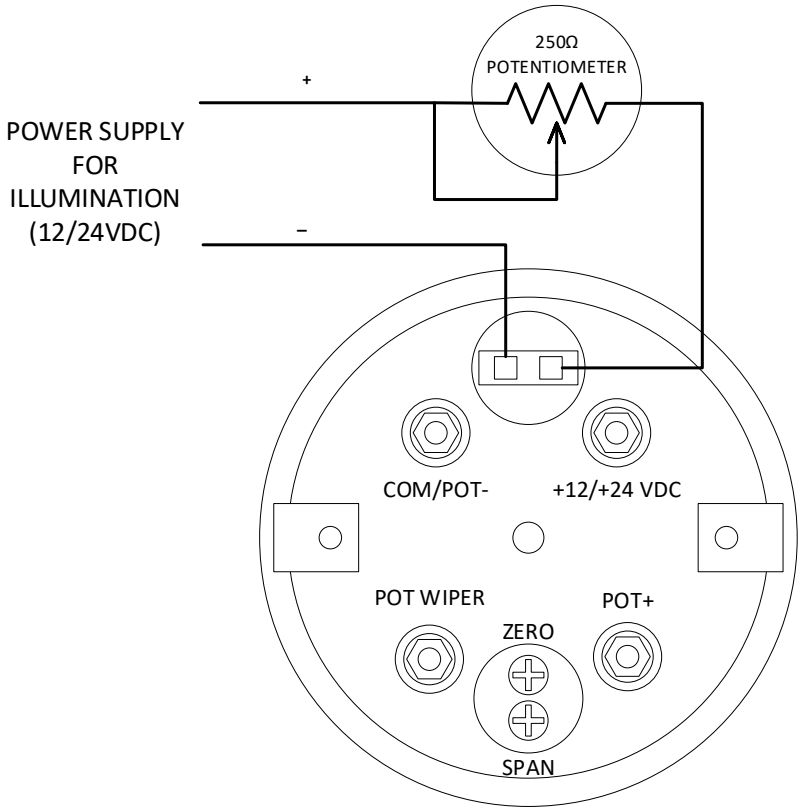


Figure 8: Potentiometer Configuration for dimmable light bulb

4 COMMISSIONING

4.1 ELECTRICAL CHECK



CAUTION

Ensure that the unit is properly installed and secured before powering on the 7175.

- Confirm that all electrical connections to the 7175 have been made.
- Confirm that a breaker has been installed correctly and is turned ON.

4.2 CALIBRATION AND ADJUSTMENT

The gauge may need to be adjusted to centre the pointer or 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 trimpots.

SAFETY INSTRUCTIONS

To reduce the potential for electrical shock and to avoid damaging the 7175 electronics, **use a non-conductive screwdriver**, or other equivalent tool, to adjust the trimpots or zeroing lever.

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

NOTICE

Ensure no oil or other contamination enters the 7175 while its cover is removed.

1. Turn OFF power to the 7175 prior to making adjustment.
2. Remove the clear plug protecting the trimpots or the zeroing lever, depending on desired adjustment.
3. Use a **non-conductive** flathead or Phillips-head screwdriver to make adjustments.
 - a. Rotate trimpot clockwise to increase
 - b. Rotate trimpot counter-clockwise to decrease
 - c. Refer to the sections below for functional details of each trimpot and the zeroing lever
4. Turn ON power.
5. Move rudder through its range to verify desired response.
6. Repeat as necessary, until the 7175 functions as desired.
7. Replace the clear plug protecting the trimpots or zeroing lever.

Default position for all configuration trimpots is at centre (pointing upward).

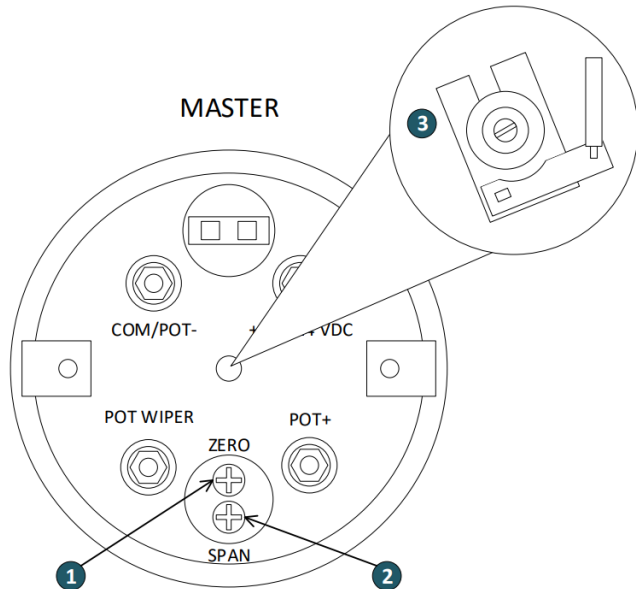


Figure 9: Master Unit Calibration Arrangement

4.2.1 ① “ZERO” Trimpot: Adjust Midpoint

The zero adjust trimpot adjusts the midpoint of the range. When the rudder is centered, adjust this trimpot to align the needle with the midpoint marking.

4.2.2 ② “SPAN” Trimpot: Adjust Range Size

The span adjust trimpot adjusts the range of the meter. The range reported by the RFU will vary depending on mechanical linkages. This trimpot can be used to calibrate the hard-over angles. The span trimpot must also be adjusted as more slave units are added in series.

4.2.3 ③ Zeroing Lever

NOTICE

The zeroing lever is configured at the factory and should not need adjustment in normal use. Only consider adjustment in the case of major zero-point misalignment due to excessive vibrations or other extreme conditions. Adjustment of the zeroing lever should be performed by qualified personnel only.

After removing the clear centre plug, the meter mechanism is visible through the small hole. Detail of the mechanism can be seen in the inset in Figure 9. Adjustments can be made using a long, thin screwdriver to move the lower part of the lever near the visible solder joint. This adjustment can be performed on both the master and slave meters.

4.3 FUNCTIONAL TEST

Before commencing normal operations with the installed unit(s). A functional test shall 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' trimpot 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.

5 OPERATION

The 7175 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.

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 5: Recommended Spares

RECOMMENDED SPARES		
QTY	ITEM	KOBELT PART #
1	T3-1/4 BULB, 24 VDC* (ANSI Model: 656)	6001-3647
1	T3-1/4 BULB, 12 VDC* (ANSI Model: 193)	6001-3633
1	LAMP HOLDER, T3-1/4 WEDGE STYLE BULBS**	7175-0102

* Select the spare bulb based on the desired operating voltage. Bulbs are the same for all models of 7175 indicators (including all discontinued models)

** Lamp holder for “-Y” legacy models (twist in) is Kobelt PN 7175-0002. All other models are compatible with the lamp holder listed above (snap in).

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 6: Common Solutions

Problem (Issue encountered)	Cause (What it means)	Corrective Action (What to do)
7175 indicator(s) not operational	Overvoltage protection circuit activated	Cycle power off and back on to reset the meter.
	Blown fuse/circuit breaker	Check and replace fuse or reset circuit breaker. Cycle power to the meter.
	Wiring issue	Check for proper wiring
7175 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 7175 unit is adequately illuminated.
7175 illumination to dim or to bright	Wrong voltage light installed	Change the bulb to match the system voltage of either 12 VDC or 24 VDC.
Master indicator moves in opposite direction to rudder	Potentiometer power wires are reversed	Reverse the wiring at the IN+ and IN- terminals of the Slave unit. Correct the wiring following the examples in Section 3.2.
Slave indicator moves in opposite direction to rudder	Input wires are reversed	Reverse the wiring at the input terminals. Correct the wiring following the examples in Section 3.2.
Port and Starboard hard-over are not equal	Rudder angle feedback unit is not installed or adjusted properly	Confirm correct installation and adjustment of the rudder angle feedback unit.
Rudder center angle does not read zero	Scale range is uncalibrated	Adjust span trimpot as described in Section 4.2 to adjust scale.
Hard-over angle isn't correct	Span trimpot needs adjustment	Adjust span trimpot as described in Section 4.2.
Rudder centre angle does not read zero	Zero adjustment is required	Adjust zero trimpot as described in Section 4.2.
Rudder Angle Needle does not rotate	Rudder angle enclosure bracket is too tight	Slightly Loosen the enclosure bracket to allow the needle to freely rotate

8 WARRANTY

Kobelt Manufacturing Co. Ltd. (“Kobelt”) warrants the Products and Parts manufactured by Kobelt 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 Kobelt recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobelt 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 Kobelt representative.

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

If any part is found to be defective, Kobelt will replace said part FOB the Kobelt factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobelt’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 Kobelt warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobelt, 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.

Kobelt will be responsible for all Products or Parts sold by Kobelt 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 Kobelt warranty.

9 APPENDIX A: INSTALLATION DIMENSIONS

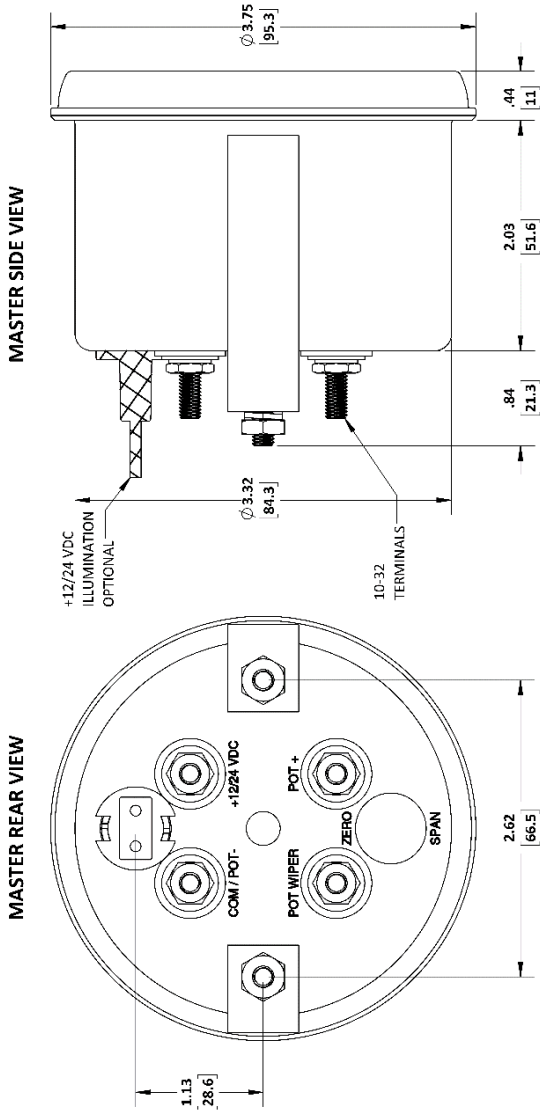


Figure 10: Mechanical Dimensions of 7175

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.

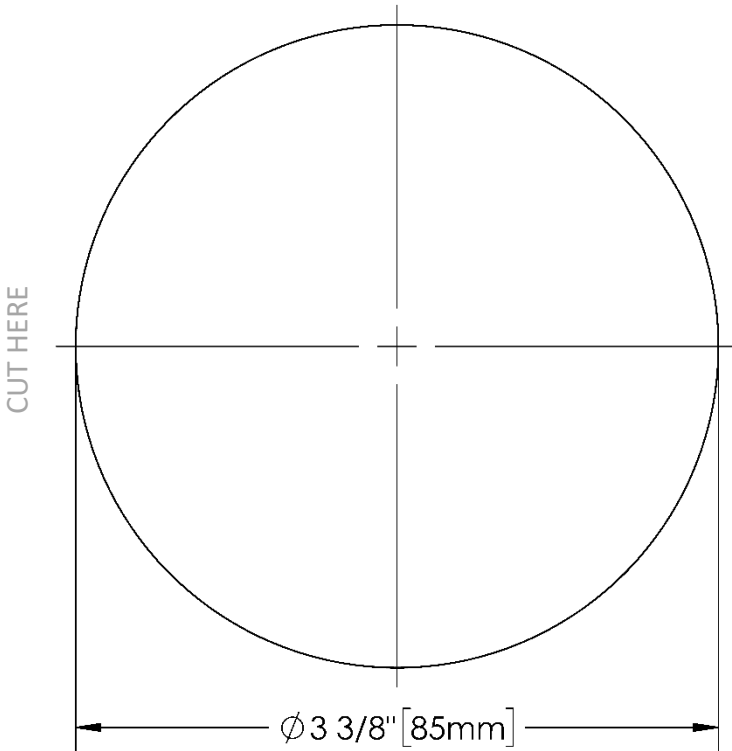


Figure 11: Installation Cut-out Template

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