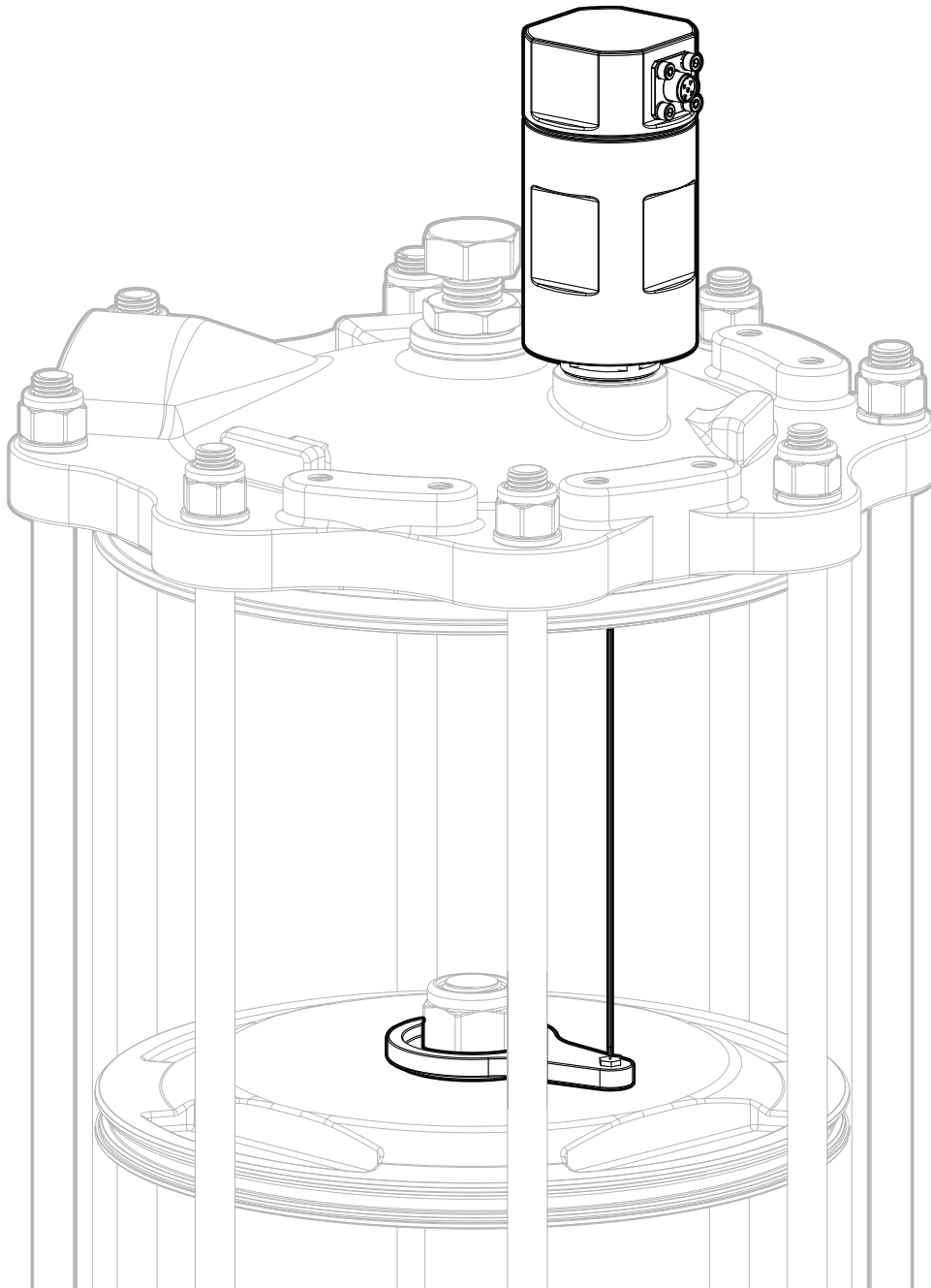

SERIES KCA

LINEAR POSITION SENSOR

Installation, Operation, and Maintenance Manual



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THE HIGH PERFORMANCE COMPANY

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**READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY.
FOR THE LATEST IOM VERSION, VISIT [BRAY.COM](https://www.bray.com)**

1.0 DEFINITION OF TERMS

All information within this manual is relevant to the safe operation and proper care of your Bray product. Please understand the following examples of information used throughout this manual.

Specific instructions for non-standard materials of construction, temperature range, etc. should be referred to the factory.

1.1 Safety Statements

To prevent unwanted consequences, standard symbols and classifications are used as shown below:



DANGER

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE

Used without the safety alert symbol, indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

NOTE: Provides important information related to a procedure.

2.0 INTRODUCTION

The Bray KCA sensor is a cable-actuated linear position sensor designed for use with Bray knife gate valve actuators. It provides an analog current output, available in either 4-20mA or 0-20mA ranges.

Additional **product information** (such as application data, engineering specifications, actuator selection, etc.) is available from your local Bray distributor or sales representative, or online at **BRAY.COM**.

For a detailed list of product certifications, please contact your local Bray representative.

3.0 BACKGROUND

The KCA sensor uses an absolute encoder sensor to measure the distance between an object and a point of reference, as well as changes in position. The sensor converts displacement into an electrical output. The linear-to-rotary-to-linear (LRL) mechanism forms the axis of a recoil spool mechanism.

The spool uses a polymer-coated, stainless-steel cable to form a reliable, repeatable coupling between the piston and the sensor. Anchoring the connector to the piston causes the cable to wind or unwind from the spool as the piston rod retracts or extends, respectively. The assembly also offers extreme immunity to shock, vibration, and environmental factors, regardless of stroke length.

4.0 PROCEDURE FOR DISASSEMBLING THE EXISTING ACTUATOR

- 1 Ensure the piston rod (80) is fully retracted into the cylinder (50) by applying air at 5 bar (75 psi) pressure through the bottom port (70) and stop the air supply when the piston rod hits the stopper bolt (90). Refer **Figure 1**.



WARNING

Ensure the pressurized air is completely released from the actuator before disassembling the actuator.

- 2 Remove the Nylock nuts (10). Refer **Figure 1**.
- 3 Remove the Washers (20). Refer **Figure 1**.
- 4 Remove the Actuator Cap (30). Refer **Figure 1**.
- 5 Remove the Piston rod lock nut (150). Refer **Figure 2**.

Figure 1: Parts Callouts

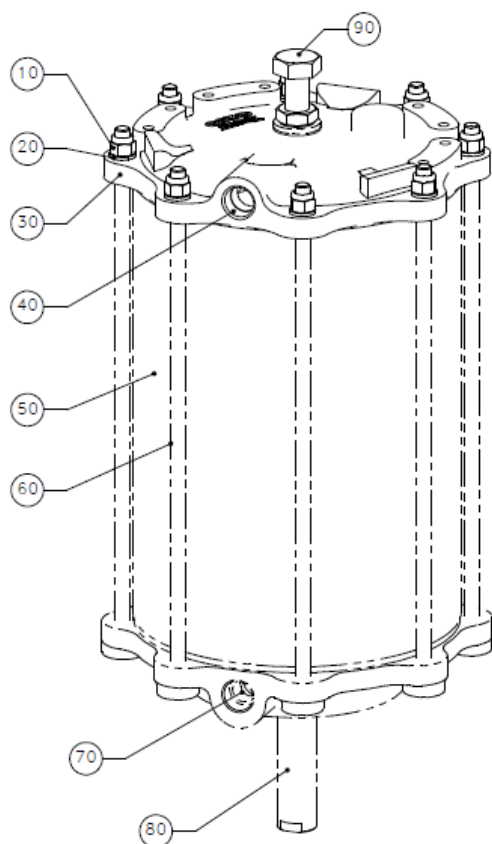
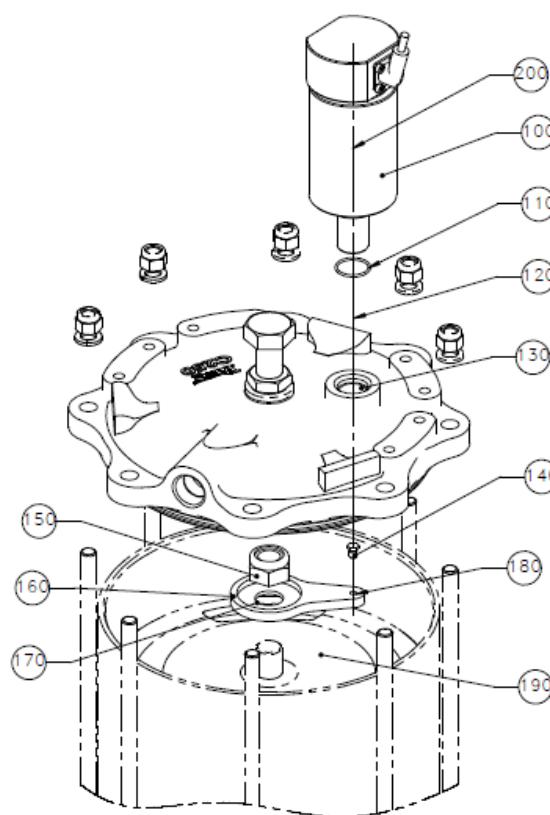


Figure 2: Parts Callouts



5.0 PROCEDURE FOR ASSEMBLING THE POSITION SENSOR KIT ON THE ACTUATOR

- 1 Ensure if the existing Actuator Cap (30) has a M24 tapped hole as shown in **Figure 4**. If the M24 tapped hole is not available on the existing Actuator Cap (30), replace with a new Actuator Cap (30) which has a M24 tapped hole as shown in **Figure 4**.
- 2 Ensure the Gasket (110) is installed between the Sensor housing (100) and the Actuator cap (30) as Refer **Figure 3a**.
- 3 By means of Cable retainer (230), pullout the Sensor cable (120) to a certain distance slowly and carefully from bottom side of the Actuator Cap (30). Refer **Figure 3**.
- 4 After the Sensor cable (120) is pulled to a certain distance by means of cable retainer (230), keep holding the Clamping screw (140) using hand or by any other means and do not release it until the steps 5.6 completed. Refer **Figure 3**.
- 5 Loosen the Cable retainer (230) and remove it from the Clamping screw (140). Refer **Figure 3**.
- 6 Install the Adaptor (160) and connect the tapped hole (180) of the Adaptor with the Clamping screw (140). Refer **Figure 2**.
- 7 Release the Clamping screw (140) and Adaptor (160) slowly and carefully.
- 8 Place the Actuator Cap (30) along with sensor kit (100) and Adaptor (160) as a sub assembly over the Tie rods (60) of the actuator assembly and maintain some clearance gap between the Actuator Cap (30) and Piston (190) to access the Adaptor (160) and Locknut (150) to proceed the further assembly steps stated below.
- 9 Connect the piston rod (80) and Adaptor (160) through the mating hole (170) provided on the Adaptor (160) by means of the Locknut (150). Refer **Figure 2**.
- 10 Tighten the Locknut (150) gently. Do not fully tighten the Locknut (150) as the adaptor tapped hole (180) needs to be aligned with the Actuator Cap tapped hole (130) in the next step 5.11.
- 11 Align the Adaptor (160) and ensure the Adaptor tapped hole (180) is approximately concentric to the Actuator Cap tapped hole (130), so that the Sensor cable (120) can travel up and down parallel to the Centre line axis (200) without touching the metal part when the actuator is powered. Refer **Figure 2**.
- 12 Fully Tighten the Locknut (150) after the Adaptor (160) alignment is done as stated in the previous step 5.11 and do not tilt the actuator cap (30) after the Adaptor alignment is done.

Figure 3: KCA Cross Section

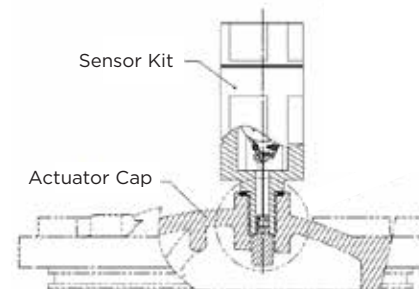
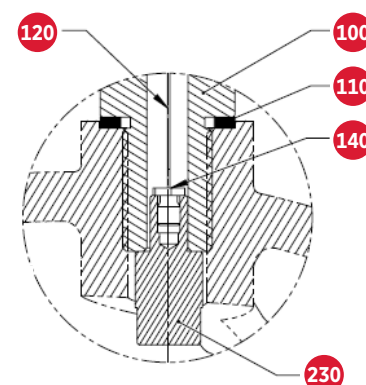
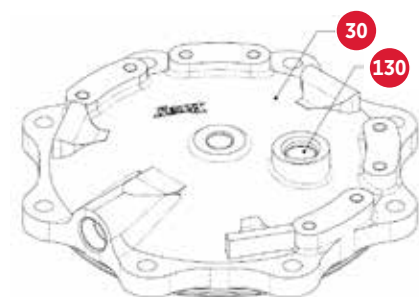


Figure 3a: Gasket position



100	Sensor Housing
110	Gasket
120	Sensor Wire
140	Clamping Screw
230	Cable Retainer

Figure 4:



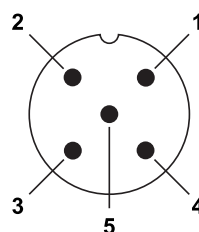
30	Actuator Cap
130	M24 Tapped Hole

- 13** Connect the Actuator Cap (30) with the cylinder Tie rods (60).
- 14** Install Washers (20).
- 15** Install Nylock nuts (10) and tighten it evenly.
- 16** Install the Stroke adjustment bolt (90), Jam Nut (210) and Thread Seal (220) on the Actuator Cap (30).

6.0 CALIBRATION OF THE POSITION SENSOR

- 1 Ensure that the actuator equipped with position sensing system is assembled with valve before starting the position sensor calibration process.
- 2 Refer the Pin diagram shown in **Figure 5**.

Figure 5: M12 Connector



PIN	Signal Analog	
1	I_{OUT}/U_{OUT}	(Brown)
2	+UB	(White)
3	GND	(Blue)
4	Limit 1	(Black)
5	Limit 2	(Gray)

- 3 Connect the 24V DC source positive terminal to Pin 2 (White lead) and negative terminal to Pin 3 (Blue lead).
- 4 Connect the Loop calibrator or Multimeter positive terminal to Pin 1 (Brown lead) and negative terminal to Pin 3 (Blue lead).
- 5 Operate the actuator and monitor the change in output signal measured through Loop calibrator or Multimeter.
- 6 Disconnect the Loop calibrator or Multimeter.
- 7 Operate the actuator to the fully open position and mate Pin 2 (White lead) with Pin 4 (Black lead) for more than 6 sec and remove the Black lead (Open Limit Teaching).
- 8 Operate the actuator to the fully close position and mate Pin 2 (White lead) with Pin 5 (Gray lead) for more than 6 sec and remove the Gray lead (Close Limit Teaching).
- 9 Connect the loop calibrator or Multimeter positive and negative terminals to Pin 1 (Brown Lead) and Pin 3 (Blue Lead) respectively, check the readings by operating the actuator (full stroke).
- 10 With output signal range of 4-20mA, ensure 4mA and 20mA are measured at the corresponding endpoints of the actuator stroke. If using the 0-20mA output option, verify that 0mA and 20mA are measured at the endpoints of the stroke.

7.0 INTEGRATION OF POSITION SENSOR WITH SERIES 6A POSITIONER USING THE AIM MODULE [6A6DR4-0048F]

- 1 Calibrate the actuator position sensor. Ensure it provides 0-20ma output for open and closed.
- 2 Wire the KCA sensor to the S6A positioner as shown in the wiring diagram **Figure 8** (pg. 11).
- 3 Configure the AIM module switch block as shown in **Table 1**.

Table 1: Configuration

Measuring Range	Switch Block 1		Switch Block 2			
	S1-1	S1-2	S2-1	S2-2	S2-3	S2-4
20 mA	OFF	OFF	ON	OFF	ON	OFF

- 4 Plumb the actuator and positioner.
 - 5 Power on the positioner by providing a 4 to 20mA signal.
- NOTE:** Make sure the signal does not turn off during the commissioning.
- 6 With the positioner in manual mode, check the full stroke using the up and down buttons. This step is taken to ensure the positioner is able to operate the actuator to the full stroke of the actuator.
 - 7 Position the valve to 50% open condition using the positioner.
 - 8 Set parameter “YCLS” to “uP do” for tight closing.
 - 9 Set Parameter “YCDO” to “5” %.
 - 10 Set Parameter “YCUP” to “95” %.
 - 11 Set parameter YFCT to “LWAY”.
 - 12 Call the “4. INITA” parameter. The display shows per **Figure 6**.

To begin the initialization process, go to parameter 4 and press and hold the UP button for at least 5 seconds until the display appears as shown in **Figure 7**. Keep holding until “Run1” is displayed. During the automatic initialization, the positioner will go through several steps, which are indicated on the lower line of the display. The duration of the initialization process varies depending on the actuator used and can take up to 15 minutes.

- 13 The display, as shown in **Figure 9**, indicates that the initialization is complete.

Figure 6: Initialization parameter



Figure 7: Starting automatic initialization



Figure 9: Initialization was completed successfully

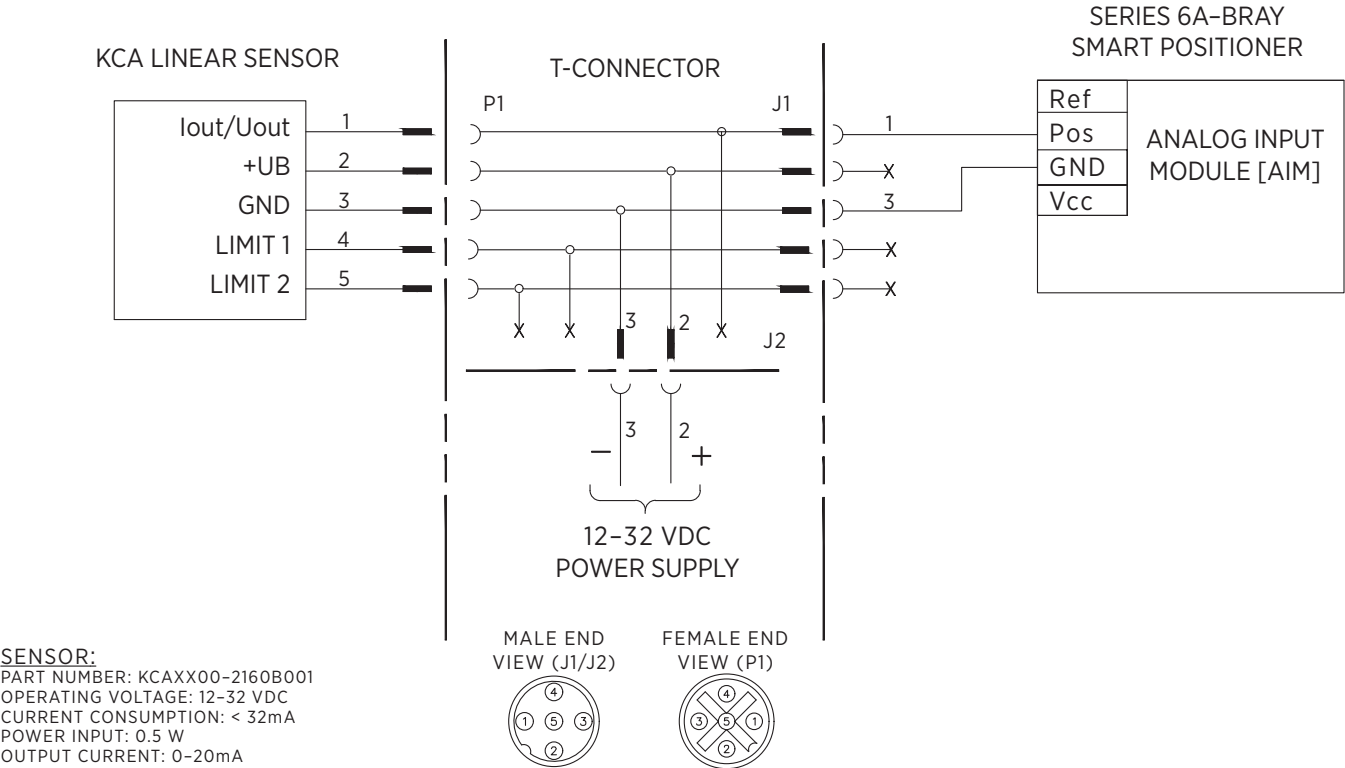


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Figure 8: Wiring Diagram



8.0 SAFETY MESSAGES

All safety messages in the instructions are flagged with the word Caution, Warning or Danger. These messages must be followed exactly to avoid equipment damage, personal injury, or death.



CAUTION

Ensure the actuator is depressurize and de-energize before disassembling it.



CAUTION

Do not pull or release the sensor wire (120) suddenly, because the sensor wire (120) is subjected to tension force when it is being pulled and a sudden release of the sensor wire (120) can cause damage to the sensor (100) and the sensor wire (120). Hence, it is necessary to ensure that the sensor wire (120) is pulled and released slowly and carefully to avoid damage.



CAUTION

If the actuator is pressurized and the gasket sealing the sensor to the actuator cap port is improperly installed, it can lead to air leakage through the actuator cap port. This may cause the actuator to malfunction. Ensure that the gasket is installed correctly, then gradually pressurize the cylinder and check for any leaks.



WARNING

Do not remove the KCA sensor cover when the actuator is under pressure. The threaded cover serves as an anti-blowout mechanism for the sensor. If the cover is not properly installed before pressurizing the actuator, the sensor could be ejected from its enclosure. Therefore, it is crucial to ensure that the housing cap is securely in place before applying pressure to the actuator.



CAUTION

Do not tilt the Actuator Cap (30) after the Adaptor (160) is fully tightened (stated in step 4.11), because any tilting movement of Actuator Cap (30) can cause damage to the Sensor Wire (120). Hence it is necessary to ensure that the Actuator Cap (30) is not tilted after the Adaptor (160) is tightened with the Piston rod (80).



CAUTION

Do not extend the cable beyond the specified maximum extension length.

**CAUTION**

For proper functioning do not squeeze or bend the cable.

**CAUTION**

All lines for connecting the sensor must be shielded.

**CAUTION**

Switch on operating voltage together with downstream electronics (e.g control unit).

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BRAY INTERNATIONAL, INC.

13333 Westland East Blvd.

Houston, Texas 77041

Tel: +1.281.894.5454

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