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Hall-Effect Rotary Position Sensors

RTY Series



RTY Series Hall-Effect Rotary Position Sensors

The RTY Series Hall-Effect Rotary Position Sensors provide angle monitoring in harsh transportation and industrial applications at a competitive cost.

These products use a magnetically biased, Hall-effect integrated circuit (IC) to sense rotary movement of the actuator shaft over a set operating range. Rotation of the actuator shaft changes a magnet's position relative to the IC. The resulting flux density change is converted to a linear output.

The IC, together with conditioning and protection circuitry, and the permanent magnet, is sealed in an IP67-qualified rugged package for durability in most harsh environments.

Eight operating ranges (50°, 60°, 70°, 90°, 120°, 180°, 270° and 360°) are tolerant to over-travel and allow use in most common applications. Low voltage and high voltage versions cover an input voltage range of 4.5 Vdc to 30 Vdc.

Although most applications require no lever, a lever version is available. The lever may allow customers to reduce the number of mechanical linkages required for their application, which may reduce the cost of the overall customer solution. No brackets are necessary.

Honeywell's industry-leading capabilities in research and development provide the customer with known quality and support.

What makes our sensors better?

- Long application life (35 M)
- High durability
- High flexibility
- Cost effective

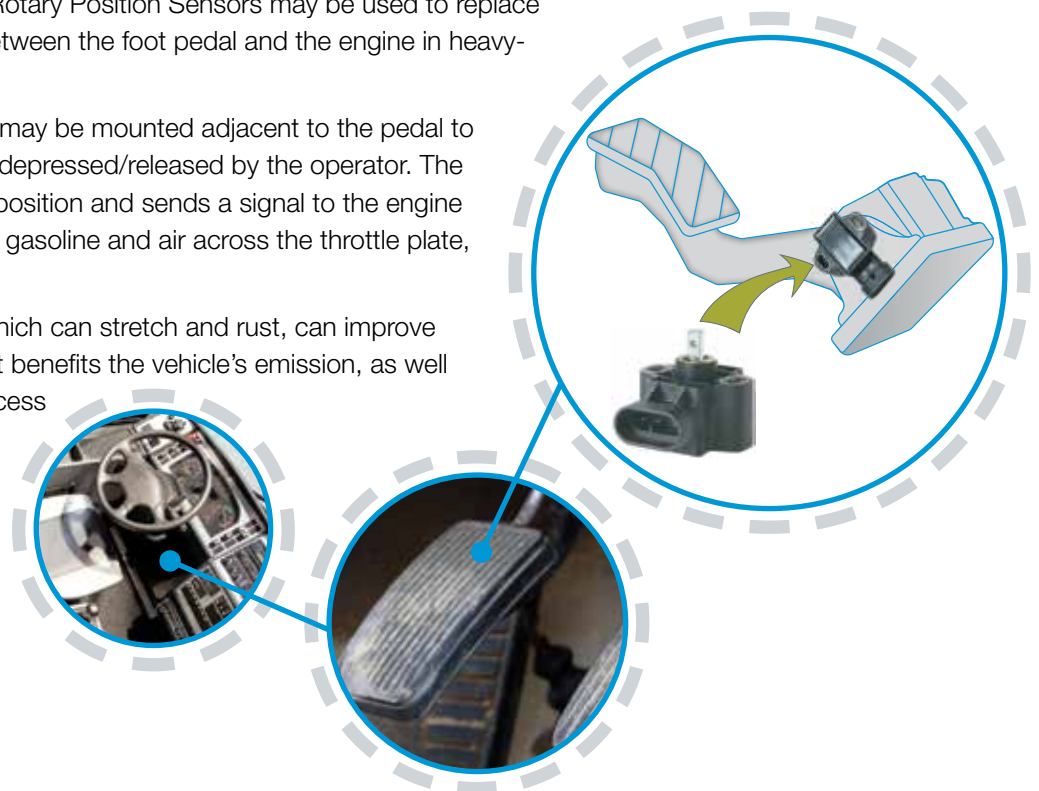


How the sensor may be used

Honeywell's RTY Series Hall-effect Rotary Position Sensors may be used to replace the mechanical cable connection between the foot pedal and the engine in heavy-duty equipment and other vehicles.

For example, an RTY Series sensor may be mounted adjacent to the pedal to measure how far down the pedal is depressed/released by the operator. The sensor senses the change in pedal position and sends a signal to the engine to either increase/reduce the flow of gasoline and air across the throttle plate, as needed.

Eliminating the mechanical cable, which can stretch and rust, can improve engine control system response that benefits the vehicle's emission, as well as improve reliability, and reduce excess weight in the vehicle. This type of drive-by-wire system can be safer and less expensive than cable-connected systems.



Features and Benefits

Long application life.

35 M CYCLE PRODUCT LIFE*

Provides long life in the application

SOLID-STATE HALL-EFFECT TECHNOLOGY

Provides non-contact operation, long service life, low torque actuation and reduces worn-out mechanisms

RUGGED IP67-SEALED PACKAGE WITH INTEGRAL CONNECTOR

Allows for use in harsh environments

Flexibility of use within application.

AUTOMOTIVE-GRADE EMI/EMC TESTING, INTEGRATED REVERSE POLARITY, AND SHORT CIRCUIT

Provides protection against installation errors and frequencies in the environment

INDUSTRY-STANDARD AMP TERMINATION, 32 MM MOUNTING PITCH, NORTH AMERICAN AND EUROPEAN PINOUT STYLES, AND COMPACT PACKAGE

Provides drop-in replacement

EIGHT OPERATING RANGES UP TO 360°

Provides flexibility in multiple applications, allowing OEMs the range of travel needed for the application

*Competitive Differentiator

Potential Applications



TRANSPORTATION

POSITION AND MOVEMENT DETECTION (PEDALS, THROTTLES, GEAR SHIFT, LEVERS, STEERING, LINKAGES, AND HITCHES IN TRUCKS, BUSES, OFF-ROAD VEHICLES, CRANES, AND INDUSTRIAL/CONSTRUCTION/AGRICULTURAL VEHICLES AND EQUIPMENT)

May be used to sense angular position of these vital components to enhance fuel economy, equipment/engine performance, and safety.



SUSPENSION/KNEELING POSITION (BUSES, TRUCKS)

May be used to sense angular travel of the suspension system. Accurate sensing validates the correct height for the application's system requirements, potentially aiding vehicle ingress/egress (liability), trailer height for warehouse docking (faster turns and liability), and suspension performance monitoring (diagnostic check).



TILT/TRIM POSITION (BOAT ENGINES, TILLING EQUIPMENT)

May be used to sense equipment position which helps provide accurate reporting so that the operator can maintain peak performance and protect against equipment damage.

INDUSTRIAL

VALVE CONTROL

May be used to sense valve position to regulate flow which allows facilities to achieve greater throughputs.

HVAC DAMPER CONTROL

May be used to sense damper position to regulate airflow, providing system efficiency and facility occupant comfort.

IRRIGATION PIVOT CONTROL

May be used to sense irrigation equipment steering angle to deliver water where it is needed, potentially reducing water consumption and increasing crop yield.

Hall-Effect Rotary Position Sensor

Figure 1. Product Nomenclature and Order Guide

| RTY Series | 050 Sensing Range Angle | LV Supply Voltage | E Pinout Style | B Output Type | A Lever |
|--|--------------------------------------|-----------------------------|--------------------------|---|------------------------|
| RTY Series Hall-Effect Rotary Position Sensor | 050 50° (±25°) | LV 5 Vdc | E European | A Standard: 0.5 Vdc (left), 4.5 Vdc (right) | X Without lever |
| | 060 60° (±30°) | HV 10 Vdc to 30 Vdc | N North American | B Inverted: 4.5 Vdc (left), 0.5 Vdc (right) | A With Lever |
| | 070 70° (±35°) | | | | |
| | 090 90° (±45°) | | | | |
| | 120 120° (±60°) | | | | |
| | 180 180° (±90°) | | | | |
| | 270 270° (±135°) | | | | |
| | 360 360° (±180°) | | | | |

RTY Series

Table 1. Specifications

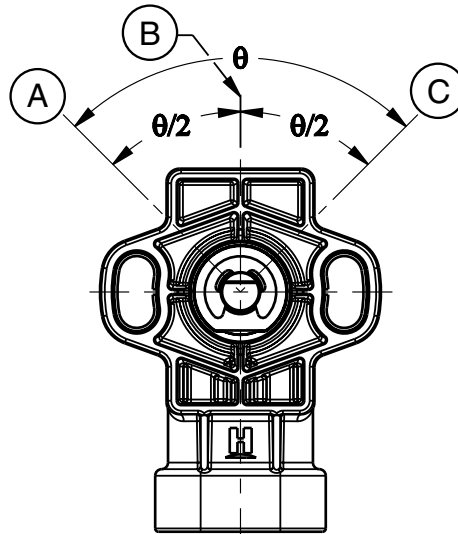
| Characteristic | Parameter | |
|---|---|---|
| | LV (Low Voltage) | HV (High Voltage) |
| Supply voltage | 5 ±0.5 Vdc | 10 Vdc to 30 Vdc |
| Supply current | 20 mA max. | 32 mA max. |
| Supply current (during output to ground short) | 25 mA max. | 47 mA max. |
| Output: standard inverted ² | 0.5 Vdc to 4.5 Vdc ratiometric 4.5 Vdc to 0.5 Vdc ratiometric | 0.5 Vdc to 4.5 Vdc non-ratiometric 4.5 Vdc to 0.5 Vdc non-ratiometric |
| Output signal delay | 4 ms typ. | |
| Oversvoltage protection | 10 Vdc | - |
| Reverse polarity protection | -10 Vdc | -30 Vdc |
| Output to ground short circuit protection | continuous | |
| Output load resistance (pull down to ground) | 10 kOhm typ. | |
| EMI: radiated immunity conducted immunity | 100 mV per ISO11452-2 from 200 MHz to 1000 MHz 100 mA BCI per ISO11452-4 from 1 MHz to 200 MHz | 100 mV per ISO11452-2 from 200 MHz to 1000 MHz 100 mA BCI per ISO11452-4 from 1 MHz to 400 MHz |
| EMC | exceeds CE requirements | |
| Operating temperature range | -40 °C to 125 °C [-40 °F to 257 °F] | |
| Storage temperature range | -40 °C to 125 °C [-40 °F to 257 °F] | |
| Ingress protection | IP67 according to DIN 40050 | |
| Expected life | 35 M cycles | |
| Media compatibility | heavy transportation fluids | |
| Housing material | PBT plastic | |
| Shock ¹ | 50 G peak | |
| Vibration ¹ | 20 G peak tested from 10 Hz to 2000 Hz | |
| Salt fog | concentration 5% ±1% for 240 hr per SAE M1455 Section 4.3.3.1 (at 5.0 Vdc, 38 °C [100 F °]) | |
| Resolution | 12 bit | |
| Mating connector | AMP Superseal 282087-1 | |
| Mechanical end stop | no | |
| Approvals | CE | |

¹ Applies to RTY sensor without lever only.

² Removes the requirement for the customer to have to invert the logic associated with the application. This is a convenience for the customer, and in some cases, can simplify the customer's overall solution.

Hall-Effect Rotary Position Sensor

Figure 2. Mounting Dimensions (For Reference only: mm/[in].)



| Standard Output | Inverted Output |
|---------------------------|---------------------------|
| Ⓐ = Left output: 0.5 Vdc | Ⓐ = Left output: 4.5 Vdc |
| Ⓑ = Zero reference | Ⓑ = Zero reference |
| Ⓒ = Right output: 4.5 Vdc | Ⓒ = Right output: 0.5 Vdc |

Table 2. Pinout

| North American | European |
|----------------|----------------|
| Pin 1 = Vcc | Pin 1 = GND |
| Pin 2 = GND | Pin 2 = Vcc |
| Pin 3 = Output | Pin 3 = Output |



NOTICE
 Ferrous material or more than 300 Gauss magnet within a 10 mm [0.39 in] radius of sensor may affect sensor performance.

RTY Series

Table 3. Functional Characteristics - Standard Output

| Sensing Angle | Linearity Error | Accuracy Error | |
|---------------|-----------------|----------------|--|
| 50° (±25°) | ±1.0% | ±1.6% | |
| 60° (±35°) | | | |
| 70° (±35°) | | | |
| 90° (±45°) | | | |
| 120° (±60°) | | | |
| 180° (±90°) | | | |
| 270° (±135°) | | | |
| 360° (±180°) | | | |

- See Figure 2 for A, B, C references.
- The linearity error is the deviation of the measured value from the best fit line and is the quotient of the measured output ratio deviation from the best fit line at the measured temperature to the best fit line output ratio span at the measured temperature.
- Accuracy is measured as a deviation from the index line, where the index line is defined as the line with the ideal slope and sensor output voltage corrected at 0° position for its ideal value at 25 °C ±5 °C. Accuracy is valid only when the sensor output is correct at 0° position for its ideal value in the application.

Hall-Effect Rotary Position Sensor

Table 4. Functional Characteristics - Inverted Output

| Sensing Angle | Linearity Error | Accuracy Error | |
|---------------|-----------------|----------------|--|
| 50° (±25°) | ±1.0% | ±1.6% | |
| 60° (±35°) | | | |
| 70° (±35°) | | | |
| 90° (±45°) | | | |
| 120° (±60°) | | | |
| 180° (±90°) | | | |
| 270° (±135°) | | | |
| 360° (±180°) | | | |

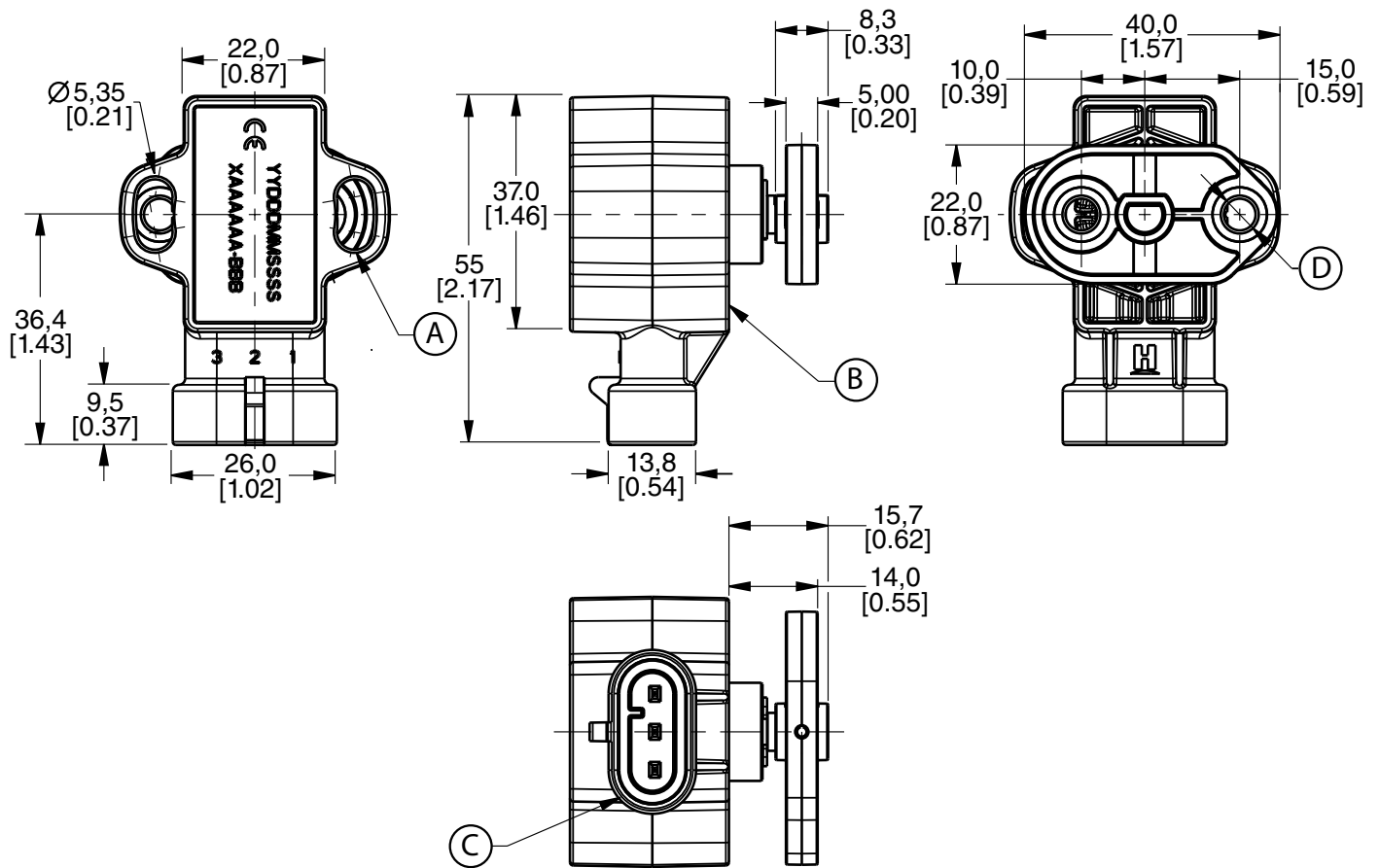
• See Figure 2 for A, B, C references.

• The linearity error is the deviation of the measured value from the best fit line and is the quotient of the measured output ratio deviation from the best fit line at the measured temperature to the best fit line output ratio span at the measured temperature.

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RTY Series

Figure 3. Dimensional Drawings for RTY Sensor with Lever (For reference only: mm [in])



(A)

(B) Mount sensor with non-magnetic stainless steel M5 screws. Mounting torque is $2,5 \pm 0,5$ N m [$22,1 \pm 4,4$ in-lb].

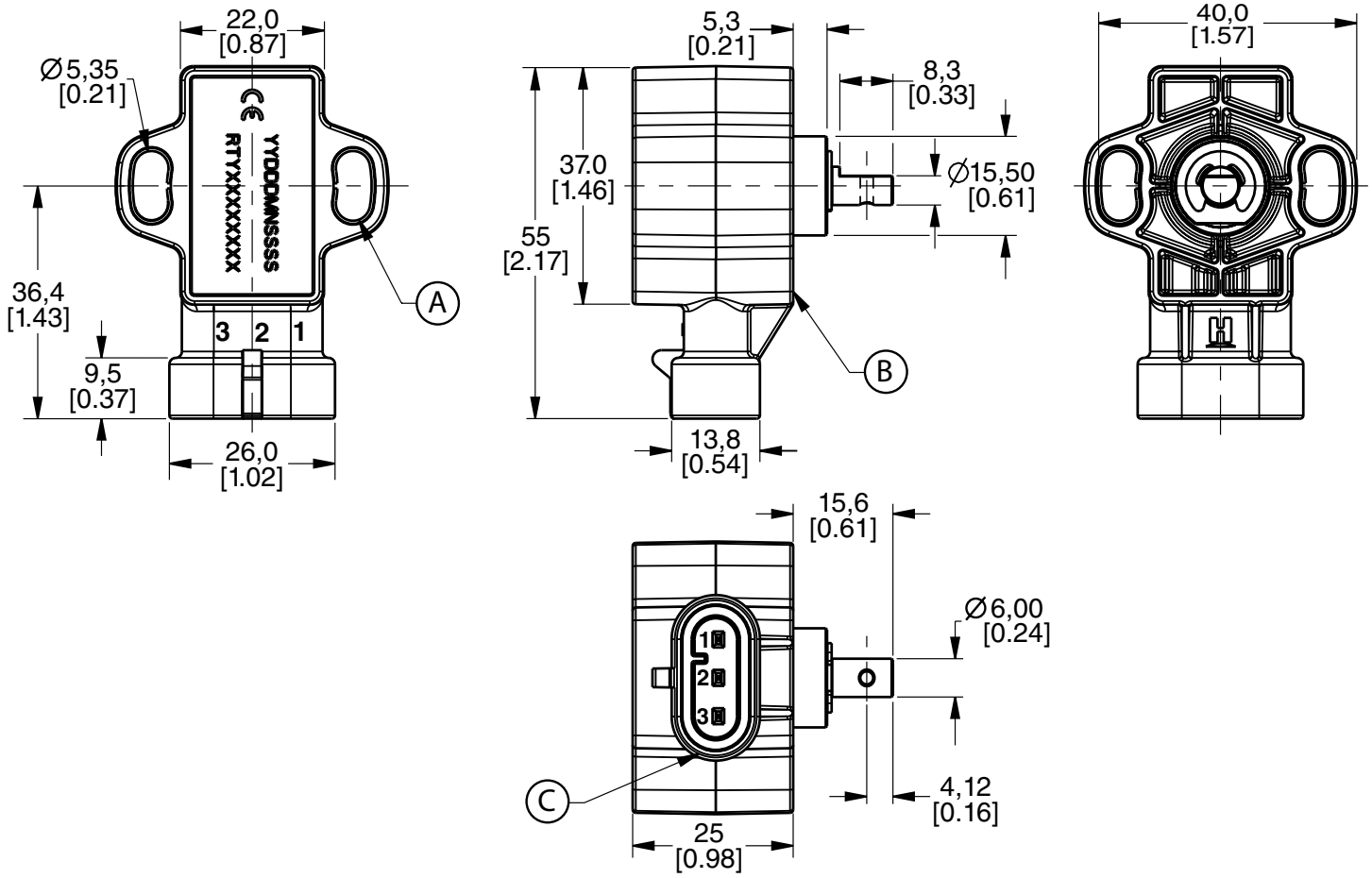
(C) Mounting surface.

(D) Mating connector is AMP Superseal 282087-1.

Mount lever using M6x1 screws. Mounting torque is 8 N m [70.8 in-lb] max.

Hall-Effect Rotary Position Sensor

Figure 4. Dimensional Drawings for RTY Sensor without Lever (For reference only: mm [in])



- (A) Mount sensor with non-magnetic stainless steel M5 screws. Mounting torque is 2.5 ± 0.5 N m [22.1 \pm 4.4 in-lb].
- (B) Mounting surface.
- (C) Mating connector is AMP Superseal 282087-1.

RTY Series

ADDITIONAL INFORMATION

The following associated literature is available on the Web:

- [Product line guide](#)
- [Product range guide](#)
- [Product installation instructions](#)
- [Product nomenclature tree](#)
- Application note:
 - [TRANSPORTATION AND INDUSTRIAL APPLICATIONS: RTY Series Hall-Effect Rotary Position Sensors](#)

⚠ WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this datasheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell website, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or email us at **info.sc@honeywell.com**. Visit us on the Web at **sensing.honeywell.com**

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Sensing and Control

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