

## SERIES 68B

### Hall Effect Rocker Switch

#### FEATURES

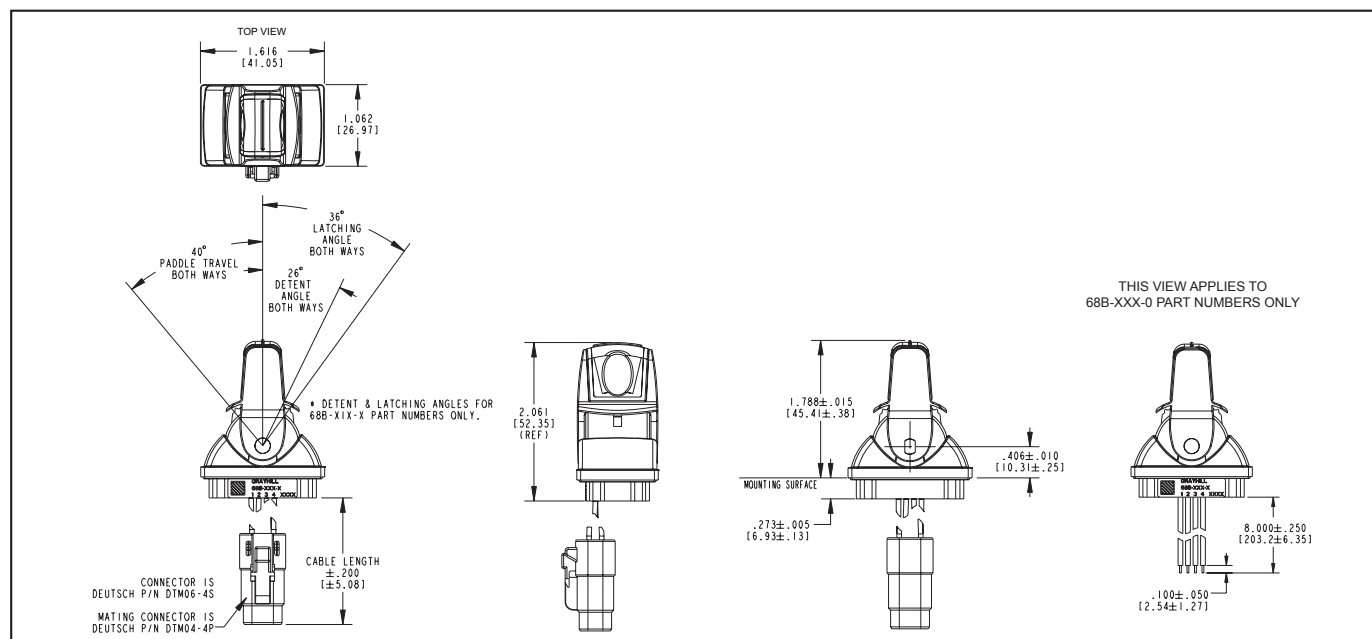
- Choice of ratiometric analog or PWM outputs
- Sealed to IP67 dynamic - even during actuation
- Rugged industrial design suited for outdoor use
- Provides positive tactile feedback in any environment
- Long operational life
- Redundant output for safety
- Available with 26° detent and 36° latching, friction hold, or spring return (no detent)
- Choices of cable length
- Choices of accent color

#### APPLICATIONS

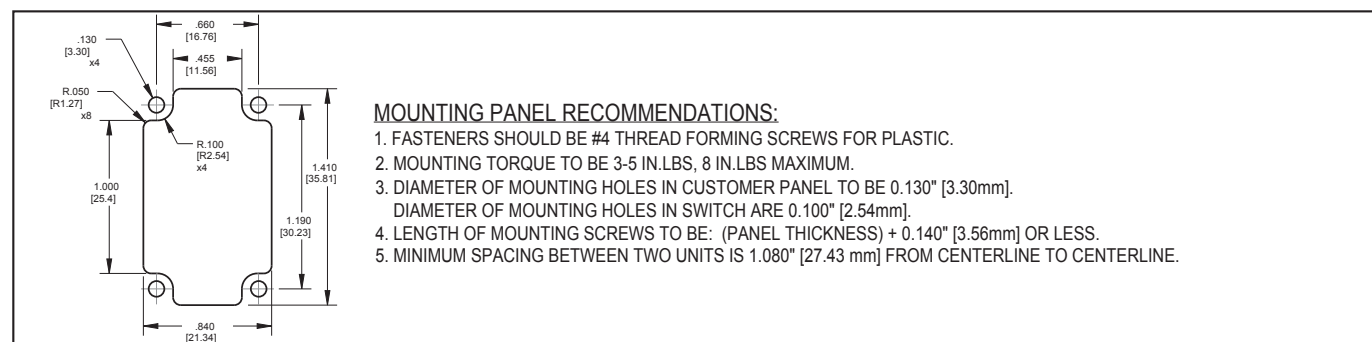
- Dash-panel and armrest controls
- Hydraulic fluid flow control
- Engine speed control
- Heavy duty industrial equipment
- Remote control belly boxes



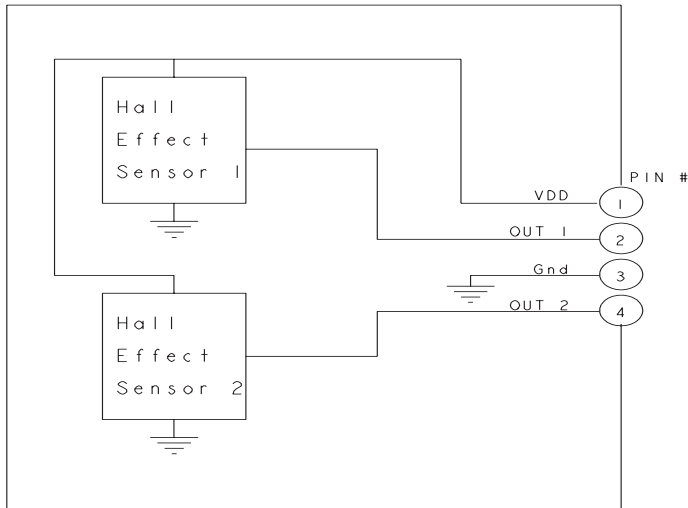
#### DIMENSIONS in inches, [mm]



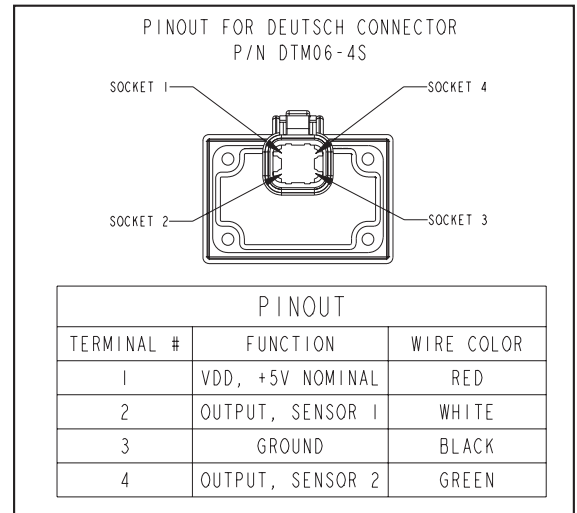
#### MOUNTING PANEL OPTIONS



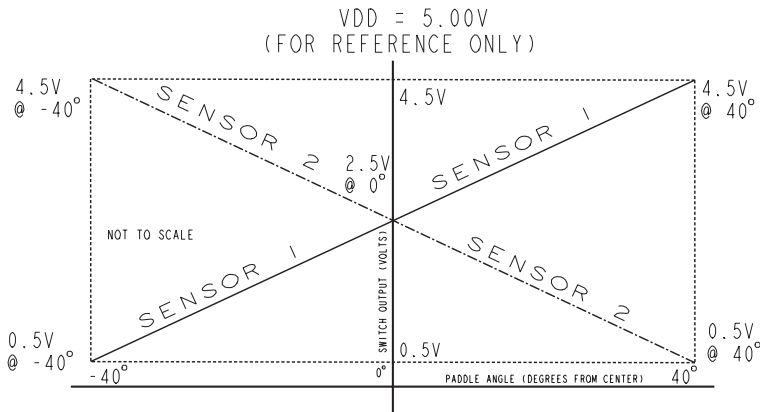
## BLOCK DIAGRAM



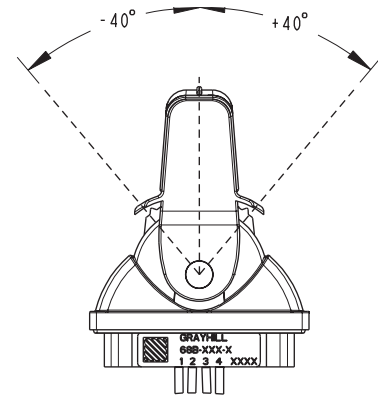
## PINOUT AND WIRE COLOR CHART



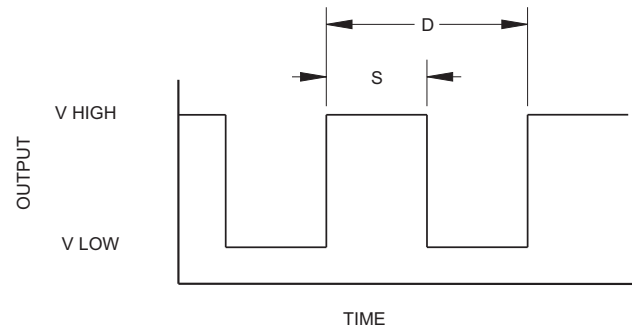
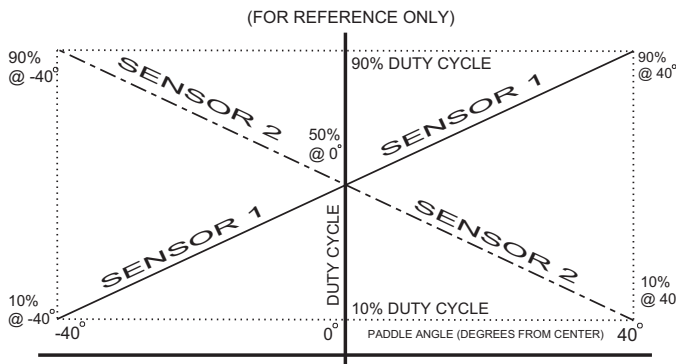
## ANALOG OUTPUT WAVEFORM



## POSITIVE/NEGATIVE DIRECTION REFERENCE



## PWM OUTPUT WAVEFORM



FAILURE INDICATIONS*		
FAILURE MODE	PWM FREQUENCY	DUTY CYCLE
SENSOR ERROR	50% ± 37.5 Hz	85% OR 95%
OVERVOLTAGE	50% ± 37.5 Hz	75%
UNDERVOLTAGE	50% ± 37.5 Hz	100%

\* IN CASE OF ERROR THE SENSOR  
CHANGES THE PWM FREQUENCY TO 50%  
OF THE NORMAL OPERATING FREQUENCY

DUTY CYCLE DEFINED AS THE RATIO BETWEEN THE  
HIGH TIME (S) AND THE PERIOD (D) OF THE PWM SIGNAL  
AS SHOWN IN FIGURE ABOVE.

**SPECIFICATIONS****Electrical Specifications**

**Operating Voltage on Pin 1 (VDD):** 5.0V  $\pm$  0.5V

**Absolute Maximum Voltage\* on Pin 1**

(VDD): -18 V min, +18 V max (t < 1 h)

**Operating Current:** 15 mA typ., 20 mA, max.

**Analogue**

**Output Voltage is Analog (Ratiometric to Operating Voltage)**

**Output at Center Position:** 50% VDD

**Output at Full Travel:** 10% VDD or 90%

VDD depending on configuration

**Output Voltage Tolerance:**

$\pm$  3% VDD at full travel

$\pm$  5% VDD at center position

**Output Current:** 1 mA, max.

**Recommended Load:** 10 K Ohm pull-down resistor.

**Sensor Error:** When a sensor error occurs, the output goes to < 4% of operating voltage (VDD)

\*Exceeding the Absolute Maximum Voltage may result in permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied.

**PWM**

**Time from Power-up to Signal Out:** 8mS Max

**PWM Frequency Tolerance:**  $\pm$  15%

**Center Position Duty Cycle:** 50  $\pm$  5%

**End Position 1 Duty Cycle:** 10  $\pm$  3%

**End Position 2 Duty Cycle:** 90  $\pm$  3%

**VOL:** 0.5V typ. @ I < 5mA; VDD= 5.00V

**VOH:** 4.9V typ. @ I < -1.2mA; VDD= 5.00V

**Recommended Load:** 1.0 K Ohm pull-up resistor.

**Physical & Mechanical Ratings**

**Vibration:** Random, meets MIL-STD-810G, Method 514.6, Procedure I

**Mechanical Shock:** Meets MIL-STD 202, Method 213B Test Condition A

**Transit Drop:** Meets MIL-STD-810G, Method 516.6, Procedure II

**Terminal Strength:** 10 lbs. minimum, tested per MIL-STD-202, Method 211A

**Push-Out Force:** 45 lbs. minimum

**Pull-Out Force:** 45 lbs. minimum

**Paddle Impact:** 0.5 lbs. weight dropped 3x

from height of 0.3m

**Paddle Side-Load:** 45 lbs. minimum

**Mounting Torque:** 3-5 in-lbs recommended,

8 in-lbs maximum

**Return to Center Life:** 2 million cycles

minimum\*\*

**Detent Life:** 200,000 cycles minimum

**Latching Life:** 200,000 cycles minimum

**Friction Hold Life:** 200,000 cycles minimum

\*\* One cycle is defined as full travel from the center to the +40° direction, then full travel to the -40° direction, then return to the center

**Environmental Ratings**

**Seal:** IP67 as mounted

**Altitude:** Meets MIL-STD-810G, Method 500.4, Procedure I

**Thermal Shock:** Meets MIL-STD-810G, Method 503.4, Procedure I

**Operating High Temperature:** +85°C, Meets

IEC 68-2-2, Test Aa

**Operating Low Temperature:** -40°C, Meets

IEC 68-2-1, Test Aa

**Storage High Temperature:** +100°C, Meets

IEC 68-2-2, Method Aa

**Storage Low Temperature:** -55°C, Meets

IEC 68-2-1, Method Aa

**Damp Heat Cycle:** Meets IEC/EN 60068-2-38 Z/AD

**Humidity, 85/85:** Meets MIL-STD 202, Method 103B, 500 hours

**Solar Radiation:** Meets ISO 4892-2, Method A, Cycle 1, 1000 hours

**Chemical Resistance:** Meets IEC 60068-2-74

**Salt Fog:** Meets MIL STD 810G

**Dielectric:** Meets MIL-STD-202G, Method 301

**Insulation Resistance:** Meets MIL-STD-202G, Method 302

**Materials and Finishes**

**Paddle:** Thermoplastic with elastomer finger grip

**Cable Assembly:** 22AWG stranded, tin-coated copper wires in PVC insulation

**Connector Body:** Thermoplastic

**Terminals:** Nickel

**RoHS Compliant**

**EMC Ratings**

**Radiated Immunity:** At 3 orientations, meets ISO11452-5 (140 V/M, 10KHz-2MHz), ANSI/ASAE EP455 5.16 (100 V/M, 2-200MHz), ISO 11452-2 (140 V/M, 200MHz-1GHz), and ISO 11452-2 (50 V/M, 1GHz-2.7GHz).

**Conducted Immunity:** Bulk Current Injection Meets ISO11452-4, SAE J1113-4 (120 mA, 1MHz-400MHz)

**Radiated Emissions:** Meets CISPR25, Class 3 (150kHz - 54MHz), CISPR 16.2.3, Class B (30-1000 MHz) and ISO13766, level 6db (30MHz - 1GHz)

**Conducted Emissions:** Meets CISPR 25, Class 5

**Electrostatic Discharge:** Meets ANSI/ASAE EP455 5.12, Level 1

**Power Frequency Magnetic Field:** Meets IEC 61000-4-8, 30 A/m

**ORDERING INFORMATION****ACCENT COLOR**

- 1 = Black
- 2 = Blue
- 3 = Purple
- 4 = Yellow
- 5 = Green
- 6 = Red

**PADDLE FUNCTION**

0 = No detent or latching

1 = 26° detent + 36° latching

2 = Friction hold

(Custom options available, contact Grayhill)

# 68B-XXX-X

**TERMINATION**

0 = No Connector; 8" wires with stripped ends

4 = 4.00" Cable with Deutsch Connector

6 = 6.00" Cable with Deutsch Connector

8 = 8.00" Cable with Deutsch Connector

**SUPPLY VOLTAGE**

5 = Analog, 5.0V Supply, Dual Inverse Outputs\*

A = PWM, 5.0V Supply, FREQ. = 500 Hz, Dual Inverse Outputs

B = PWM, 5.0V Supply, FREQ. = 2 kHz, Dual Inverse Outputs

\*OUTPUT VOLTAGE IS PROPORTIONAL TO VDD

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