Features

- Hybrid technology
- Highly resistant to vibration/shock
- Highly resistant to fluid/dust ingress
- Robust design for industrial applications
- Highly repeatable
- RoHS compliant*

HES38U-RS485 Hybrid Position Sensor

Electrical Characteristics (@ 25 °C)

VDD Supply Voltage	10 to 30 V DC
Supply Current	44 mA max.
Output Signal (Single)	RS-485
Independent Linearity	±0.1 % max.
Hysteresis	0.3 % VDD max.
Effective Electrical Angle	3600 ° ± 10 °
Output Resolution	163,840
Baud Rate	19,200

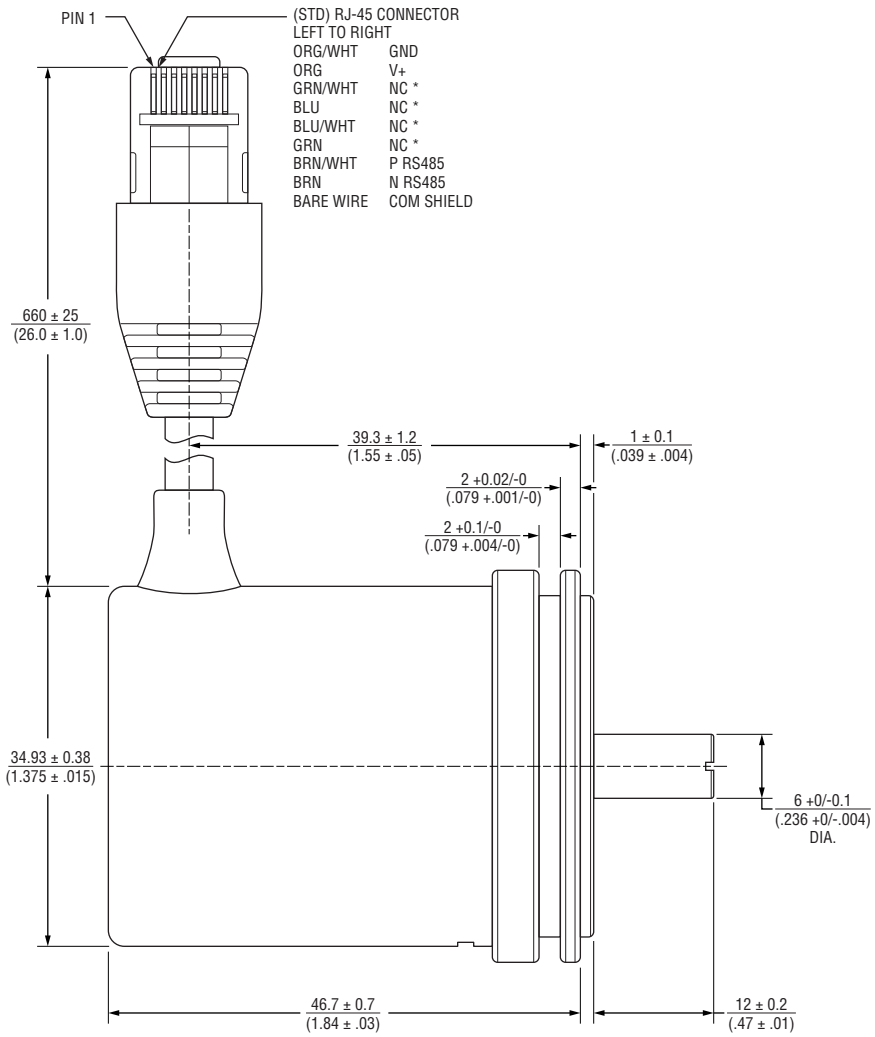
Environmental Characteristics

Storage Temperature	-40 °C to +125 °C
Operating Temperature	-40 °C to +85 °C
Moisture Resistance	MIL-STD-202, Method 106
Insulation Resistance @ 500 V AC	500 MW min.
Vibration	15 G
Shock	50 G
IP Rating	IP 65
ESD Rating	2 kV max.

Mechanical Characteristics

Mechanical Angle	3600 ° ± 10 °
Shaft/RPM	200 RPM max.
Torque	
Starting & Running	2.12 N-cm (3.0 oz-in.)max.
Mounting	2.12 N-cm (3.0 oz-in.)max.
Shaft Material	Stainless steel
Bearing	2 ball bearings
Rotational Life (Shaft Revolutions)	5 million

Product Dimensions



BOURNS®

Asia-Pacific: Tel: +886-2 2562-4117 • Email: asiacus@bourns.com
EMEA: Tel: +36 88 885 877 • Email: eurocus@bourns.com
The Americas: Tel: +1-951 781-5500 • Email: americus@bourns.com
www.bourns.com

WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.

Applications

- Patient platform positioning feedback
- 3D imaging position feedback
- Pneumatic control valve position feedback
- Draw wire position sensors
- Actuator motor position feedback
- Automated manufacturing robotics
- Electric linear actuator position sensors

HES38U-RS485 Hybrid Position Sensor

BOURNS®

How To Order

HE S 38 U - RS485 - S C 2F

Model
HE = Hybrid Encoder

Configuration
S = Serial

Body Size
38 = 38 mm Servo

Shaft
U = 6 mm diameter slotted shaft / 12 mm length

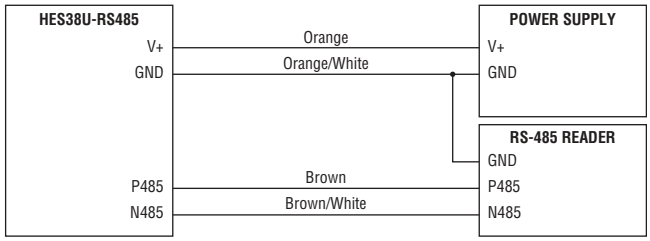
Output Type
RS485 = Non-Synchronous Serial Protocol, Differential, 163,840 Bit Output Resolution

Shaft Style
S = Slotted

Configuration
C = RJ-45 Connector

Cable Length
2F = 2 Feet

Connection Diagram



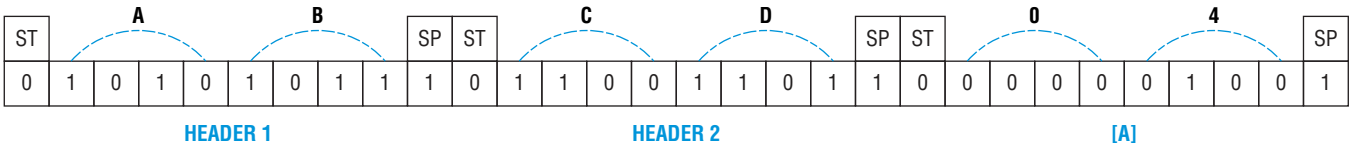
Connect the GND of the power supply with the GND of the RS-485 reader.

Serial Protocol

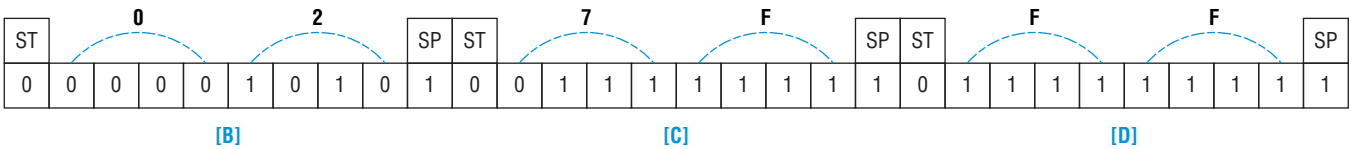
Model HES38 RS-485 Protocol

Maximum resolution for the Model HES38U is 163,840 bits = 027FFF HEX Baud Rate 19,200 BPS

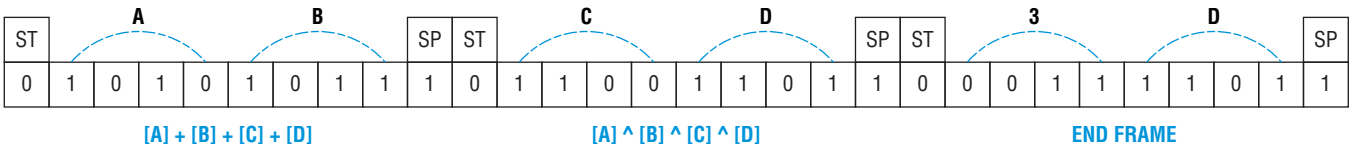
Start frame and data length



Encoder position data



Parity and end frame



(Continued on Next Page)

Serial Protocol (Continued)

Start Frame		Data Frame				Accumulate Data Sum		End of Frame
Header		Data Length	High Byte	Mid Byte	Low Byte	AND	OR	
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Header 1	Header 2	[A]	[B]	[C]	[D]	[A]+[B]+[C]+[D]	[A]^[B]^[C]^[D]	END
0XAB	0XCD	0X04	0X00 to 0X02	0X00 to 0X7F	0X00 to 0XFF	AND DATA	OR DATA	0X3D

The position data is contained within bytes B, C, and D. Together, this data makes up a 24-bit packet referred to as DATA24 which could be a valid angle or an error condition. The meaning is distinguished by the MSB. DATA24: Position data P [17.0], Error data E[15:0].

DATA24 Position Data Structure

Most Significant Byte								Middle Byte								Least SIgnificant Byte							
MSB							LSB	MSB							LSB	MSB							LSB
0	0	0	0	0	0	P17	P16	P15	P14	P13	P12	P11	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1	P0

DATA24 Error Data Structure

Most Significant Byte								Middle Byte								Least SIgnificant Byte							
MSB							LSB	MSB							LSB	MSB							LSB
1	0	0	0	0	0	0	0	E15	E14	E13	E12	E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1	E0

DATA24 Error Structure

Bit	Name	Description
E0	F_ERROR	Sensor error occurred
E1	F_INTSPIREAD	Internal SPI read failure
E2	F_ADCMONITOR	ADC failure
E3	F_ADCSATURA	ADC saturation (electrical failure or field too strong
E4	F_RGTOOLOW	Analog gain below trimmed threshold (likely reason: field too strong)
E5	F_MAGTOOLOW	Magnetic field too weak
E6	F_MAGTOOHIGH	Magnetic field too strong
E7	F_RGTOOHIGH	Analog gain above trimmed threshold (likely reason: field too strong)
E8	F_FGCLAMP	Never occurring in serial protocol
E9	F_ROCLAMP	Analog chain rough offset compensation: clipping
E10	F_MT7V	Device supply Vdd greater than 7V
E11	F_ADCVDD	Potentiometer ADC VDD disconnected

Bit	Name	Description
E12	F_ADCGND	Potentiometer ADC GND disconnected
E13	F_ADCCON	Potentiometer ADC connection disconnected
E14	F_DACMONITOR	Never occurring in serial protocol
E15	F_INTCHKSUM	Internal checksum failure
E16	—	
E17	—	
E18	—	
E19	—	
E20	—	
E21	—	
E22	—	
E23	F_SYSERROR	Internal system error flag

Legal Disclaimer Notice

BOURNS®

This legal disclaimer applies to purchasers and users of Bourns® products manufactured by or on behalf of Bourns, Inc. and its affiliates (collectively, "Bourns").

Unless otherwise expressly indicated in writing, Bourns® products and data sheets relating thereto are subject to change without notice. Users should check for and obtain the latest relevant information and verify that such information is current and complete before placing orders for Bourns® products.

The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain types of applications are based on Bourns' knowledge of typical requirements in generic applications. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user's application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Users should always verify the actual performance of the Bourns® product in their specific devices and applications, and make their own independent judgments regarding the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification. Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in nuclear, lifesaving, life-critical or life-sustaining applications, nor in any other applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage. Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any Bourns® products in such unauthorized applications might not be safe and thus is at the user's sole risk. Life-critical applications include devices identified by the U.S. Food and Drug Administration as Class III devices and generally equivalent classifications outside of the United States.

Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or "automotive grade" does not by itself mean that Bourns has approved such product for use in an automotive application.

Bourns® standard products are not tested to comply with United States Federal Aviation Administration standards generally or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aircraft or space applications. Bourns expressly identifies Bourns® standard products that are suitable for use in aircraft or space applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard product in an aircraft or space application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

Users shall not sell, transfer, export or re-export any Bourns® products or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor shall they use Bourns® products or technology in any facility which engages in activities relating to such devices. The foregoing restrictions apply to all uses and applications that violate national or international prohibitions, including embargos or international regulations. Further, Bourns® products and Bourns technology and technical data may not under any circumstance be exported or re-exported to countries subject to international sanctions or embargoes. Bourns® products may not, without prior authorization from Bourns and/or the U.S. Government, be resold, transferred, or re-exported to any party not eligible to receive U.S. commodities, software, and technical data.

To the maximum extent permitted by applicable law, Bourns disclaims (i) any and all liability for special, punitive, consequential, incidental or indirect damages or lost revenues or lost profits, and (ii) any and all implied warranties, including implied warranties of fitness for particular purpose, non-infringement and merchantability.

For your convenience, copies of this Legal Disclaimer Notice with German, Spanish, Japanese, Traditional Chinese and Simplified Chinese bilingual versions are available at:

Web Page: http://www.bourns.com/legal/disclaimers-terms-and-policies

PDF: http://www.bourns.com/docs/Legal/disclaimer.pdf