## SKH

## CANOpen Output Signal

Linear Position to 400 inches ( 10 m )<br>Compact Design • Simple To Install<br>User Adjustable Measuring Cable Orientation

## SPECIFICATIONS

| Stroke Range Options | 250 inches ( 6.4 m ), 400 inches ( 10.2 m ) |
| :---: | :---: |
| Accuracy | . $35 \% \mathrm{FS}$. |
| Repeatability | .05\% FS. |
| Resolution | 12-bit |
| Input Voltage | 10-36 VDC |
| Input Current | 100 mA , max. |
| Measuring Cable | .031-inch dia. bare stainless steel |
| Maximum Cable Velocity | 60 inches per second |
| Maximum Cable Acceleration | 5 g |
| Measuring Cable Tension | 23 oz. (6,4 N) $\pm 40 \%$ |
| Sensor | plastic-hybrid precision potentiometer |
| Cycle Life | $\geq 250,000$ |
| Electrical Connection | M12 connector, mating plug included |
| Enclosure | glass-filled polycarbonate |
| Environmental | IP67 |
| Operating Temperature | $-40^{\circ}$ to $185^{\circ} \mathrm{F}\left(-40^{\circ}\right.$ to $\left.85^{\circ} \mathrm{C}\right)$ |

## CANopen SPECIFICATIONS

| Communication Profile | CiA 301 V 4.0.2, CANopen Slave |
| :--- | ---: |
| Device Type | CiA 406 V3.2, Encoder |
| Vendor ID | $0 \times 0002 \mathrm{EO}$, Node ID |

1-127 (Adjustable via dipswitch or LSS, default set to 1)

| Baud Rate Options | 125K (default), 250K, 500K, 1M |
| :--- | ---: |
| Data Rate | 50 ms (default) |
| Error Control | Heartbeat, Emergency Message |
| PDO | 2 TxPDO, 0 RxPDO, no linking, static mapping |
| PDO Modes | Event / Time triggered, Synch / Asynch |
| SDO | 1 server, 0 client |
| Position Data | Object Dictionary 6004 |
| Cam Switches | Not Supported |



The SKH has a CANopen output signal that delivers linear position feedback for applications ranging from outrigger position on a mobile crane to tracking the height of a hydraulic lift table in a factory and everything else in between. Available in both 250 and 400 -inch stroke ranges, this model offers the ultimate ease-of-use, compact design and user flexibility. Need to mount it upside down? Simply rotate it's stainless mounting bracket to where you want it. Need the electrical connector to point in a different direction? Just rotate the rear cover to point the connector to the desired direction.

It's compact design, ease of use and the utmost in flexibility makes this model the perfect economically priced solution for both the single piece user to the higher volume OEM.

Output Signal


Outline Drawing:



DIMENSIONS ARE IN INCHES [MM]
tolerances are 0.04 IN . 11.0 MM 1 unless otherwise noted


* tolerance $=+.005-.001[+0,1-0,0]$ ** tolerance $=+.005-.005\lceil+0.1-0.11$

Mounting Options:


To change cable exit direction: simply remove the 4 bracket mounting screws and rotate sensor body to desired direction.

To change electrical connector orientation: remove the 4 rear screws and carefully remove the rear cover and rotate cover.


Ordering Information:

|  | Part Number | full stroke range | accuracy | max. acceleration | measuring cable tension ( $\pm 40 \%$ ) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $)^{\circ}()^{\circ}+\text { 䚓 }$ | SKH-250-4 | $\begin{gathered} 250 \text { in } \\ (6.4 \mathrm{~m}) \end{gathered}$ | .35\% | 5 g | $\begin{aligned} & 23 \mathrm{oz} . \\ & (6,4 \mathrm{~N}) \end{aligned}$ |
|  | SKH-400-4 | $\begin{gathered} 400 \mathrm{in} \\ (10.2 \mathrm{~m}) \end{gathered}$ | .35\% | 5 g | $\begin{aligned} & 23 \mathrm{oz} . \\ & (6,4 \mathrm{~N}) \end{aligned}$ |

includes mounting bracket \& mating connector.

| Optional Cordsets | Part Number | length | wire size | connector |
| :---: | :---: | :---: | :---: | :---: |
| 圆 | 9036810-0030 | $\begin{aligned} & 13 \mathrm{ft} \\ & (4 \mathrm{~m}) \end{aligned}$ | $\begin{gathered} 22 \mathrm{AWG} \\ \left(.34 \mathrm{~mm}^{2}\right) \end{gathered}$ | straight 5-pin M12 |
|  | 9036810-0031 | $\begin{aligned} & 13 \mathrm{ft} \\ & (4 \mathrm{~m}) \end{aligned}$ | $\begin{gathered} 22 \mathrm{AWG} \\ \left(.34 \mathrm{~mm}^{2}\right) \end{gathered}$ | $\begin{gathered} 90^{\circ} \\ 5-\text { pin } \\ \text { M12 } \end{gathered}$ |

Electrical Connection:


Position Data Overview:


Internal Controller Board

$\because$ Status LED - Indicates Operating Condition of the Potentiometer

| green <br> on <br> of | red |  |  |
| :---: | :---: | :--- | :--- |
| off | flash | emergency message (high) | buffer (high) |
| on | off | normal operating range |  |
| flash | off | buffer (low) |  |
| flash | on | emergency message (low) |  |
|  |  |  |  |

## LSS, Baud Rate and Node ID settings:

LSS, Baud Rate and Node ID settings are set via dip switch found on the internal controller board. To gain access to the controller board, remove the 4 cover attaching screws and carefully separate the sensor cover from the main body. Be careful not to damage the small gage wires that connect the potentiometer to the controller board mounted directly to the rear cover.

Follow the instructions below for desired settings and reinstall sensor cover.


|  |  |  | SW4 | SW5 | SW6 |  | SW8 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | node ID |  |  |  |  |  |  | SW9 | SW10 |
|  | Dec. | Hex | $\left(2^{\circ}\right)$ | $\left(2^{1}\right)$ | $\left(2^{2}\right)$ | $\left(2^{3}\right)$ | $\left(2^{4}\right)$ | $\left(2^{5}\right)$ | $\left(2^{6}\right)$ |
| ( | 1 | 0x01 | on | off | off | off | off | off | off |
| node ID | 2 | 0x02 | off | on | off | off | off | off | off |
| options | 3 | $0 \times 03$ | on | on | off | off | off | off | off |
| 1-127 | ... | ... | ... | ... | ... | $\cdots$ | ... | ... | $\cdots$ |
| (0x01-0x7F) | 126 | $0 \times 7 \mathrm{E}$ | off | on | on | on | on | on | on |
| 0 | 127 | 0x7F | on | on | on | on | on | on | on |

## Node ID:

If DIP Switch 1 is set to "off" then the Node ID is set via DIP switches 4-10 as shown below. The DIP switch settings are binary starting with switch number 4 $\left(=2^{\circ}\right)$ and ending with switch number $10\left(=2^{6}\right)$.

The Node ID is equal to the binary setting.

Manufacturer Objects:

| Index | Sub-Index | Name | Default | Comment |
| :---: | :---: | :---: | :---: | :---: |
| 2000 |  | Raw Position Value |  | This is the averaged, non-scaled value from the encoder. |
| 2001 |  | Emergency Buffer Distance | 0.1 | Emergency Message is sent when the output of the sensing potentiometer is outside it's calibrated range by more than $.1 \%$ of the sensors full measurement range (Emergency Buffer). This allows for non-repeatability of sensor and customers application. This object allows user ability to change buffer size along with transmission of Emergency Message, Manufacturer specific bit in error register set, and error added to error list. |

Device Profile Area:

| Index | Sub-Index | Name | Default | Comment |
| :---: | :---: | :---: | :---: | :---: |
| 6000 |  | Operating Parameters | 0X0000 |  |
| 6004 |  | Position Value | 0 | Counts proportional to measuring cable extension. Nominal values are $0 \times 008$ with cable fully retracted and 0xFE5 with cable fully extended. Format of data in CAN message is little endian - least significant byte pair first. Therefore $0 \times 008$ would be shown as " 0800 " and 0xFE5 would be shown as "E5 OF" |
| 6400 |  | Area State Register |  | SubNumber $=2$ (indicates underflow or overflow per CiA406) |
|  | 0 | Highest Subindex | $0 \times 01$ |  |
|  | 1 | Work Area State Channel 1 | 0 |  |
| 6401 |  | Work Area Low Limit |  | The averaged, non-scaled (raw) encoder data below which the encoder is out of range. |
|  | 0 | Highest Subindex | 0x01 |  |
|  | 1 | Work Area Low Limit Channel1 | 0x024 |  |
| 6402 |  | Work Area High Limit |  | The averaged, non-scaled (raw) encoder data above which the encoder is out of range. |
|  | 0 | Highest Subindex | $0 \times 01$ |  |
|  | 1 | Work Area High Limit Channel 1 | 0xF4E |  |
| 6500 |  | Operating Status | 0x0000 |  |
| 6501 |  | Measuring Step | 1 | Position Measuring Step. Can be set by user to convert Position Value (Object 6004) to measurement units (inches, mm). Default is set to 1 . |

Communication Area Profile:

| Index | Sub-Index | Name | Default | Comment |
| :---: | :---: | :---: | :---: | :---: |
| 1000 |  | Device Type | OX00080196 | Device Profile 406 |
| 1001 |  | Error Register | 0 | Manufacturer Specific Error bit 7 is set when sensor is outside of calibrated range and cleared when back in range. |
| 1003 |  | Pre-Defined Error Field |  | SubNumber= 9 (lists last eight Emergency Messages) |
|  | 0 | Number of Errors | 0 |  |
|  | 1 | Standard Error Field 1 |  |  |
|  | 2 | Standard Error Field 2 |  |  |
|  | 3 | Standard Error Field 3 |  |  |
|  | 4 | Standard Error Field 4 |  |  |
|  | 5 | Standard Error Field 5 |  |  |
|  | 6 | Standard Error Field 6 |  |  |
|  | 7 | Standard Error Field 7 |  |  |
|  | 8 | Standard Error Field 8 |  |  |
| 1005 |  |  |  |  |
| 1010 |  | Store Parameters |  | SubNumber=2 |
| 1010 | 0 | Highest Subindex | $0 \times 01$ | Only "Save All Parameters" feature supported |
|  | 1 | Save All Parameters |  | Write "save" or "evsa" to save parameters to EEPROM. They are automatically loaded on power up/reset. Saves the value of all R/W object dictionary entries. |
| 1014 |  | Emergency COB-ID | $\begin{aligned} & \text { \$NodeID + } \\ & \text { 0x80 } \end{aligned}$ | COB-ID Emergency Message |
| 1015 |  | Emergency Inhibit Time | 0 | Multiple of 100us. Minimum time between transmissions of emergency messages. |
| 1017 |  | Producer Heartbeat Time | 0 | Multiples of 1 ms . Time between transmission of heartbeat messages. $0=$ disabled |
| 1018 |  | Identity Object |  |  |
|  | 0 | Number of Entries | 4 |  |
|  | 1 | Vendor Id | 0x2E0 |  |
|  | 2 | Product Code | 0x10D | Celesco Reference \# 604269 |
|  | 3 | Revision Number | 0x1 |  |
|  | 4 | Serial Number | 0xFFFFFFFFF |  |
| 1800 |  | Tx PDO Comm. Parameter |  | PDO1 |
|  | 0 | Number of Entries | 5 |  |
|  | 1 | COB-ID | $\begin{aligned} & \text { \$NodeID + } \\ & 0 \times 108 \end{aligned}$ | COB-ID used by PDO1 |
|  | 2 | Transmission Type | 254 | PDO1 Tx Type: $0=$ on Sync Message. 254 = Asynchronous Tx |
|  | 3 | Inhibit Time | 0 | Multiple of 100us. Minimum time between transmissions of the PDO |
|  | 5 | Event Timer | 0x32 | If non-zero then transmits the PDO periodically. This value is a multiple of 1 ms . |

Communication Area Profile (cont.):

| 1801 |  | Tx PDO Comm. Parameter |  | PDO2 |
| :---: | :---: | :---: | :---: | :---: |
|  | 0 | Number of Entries | 5 |  |
|  | 1 | COB-ID | $\begin{aligned} & \text { \$NodeID + } \\ & 0 \times 280 \end{aligned}$ | COB-ID used by PDO2 |
|  | 2 | Transmission Type | 0 | PDO2 Tx Type: $0=$ on Sync Message. $254=$ Asynchronous Tx |
|  | 3 | Inhibit Time | 0 | Multiple of 100 us. Minimum time between transmissions of the PDO |
|  | 5 | Event Timer | 0 | If non-zero then transmits the PDO periodically. This value is a multiple of 1 ms . |
| 1 A 00 |  | Tx PDO Mapping Parameter |  | Subnumber = 2 |
|  | 0 | Number of Entries | 1 |  |
|  | 1 | PDO Mapping Entry | 0x60040020 | Mapping Parameter |
| 1A01 |  | Tx PDO Mapping Parameter |  | Subnumber = 2 |
|  | 0 | Number of Entries | 1 |  |
|  | 1 | PDO Mapping Entry | 0x60040020 | Mapping Parameter |
|  |  |  |  |  |

