

# Control of DC Motors

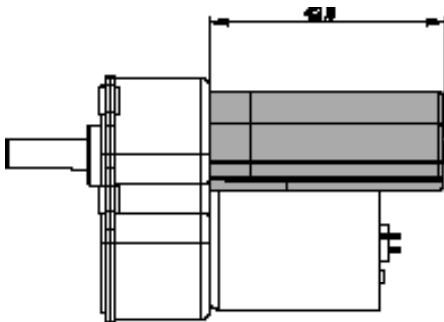
## Absolute Encoder

Issue 01

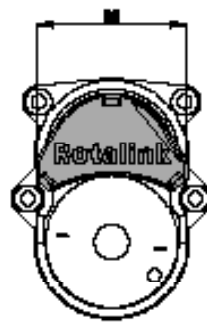


# Rotalink

Miniature Motors, Transmission and Control



Multi turn unit



Single turn unit

Our absolute output shaft encoders provide accurate positional information unaffected by power loss and self correcting in the face of electrical interference. They operate via contactless magnetic technology providing either a linear analogue output (Rail-Rail, 0-5V\*) or reliable 10bit/32bit positional data sent via a SSI (synchronous serial interface).

The single turn absolute encoder operates through the full 360° of rotation and accurately monitors its position indefinitely without power.

The multi turn operates through 32000 revolutions whilst still providing the maximum resolution of 10bits per 360° and is fitted with an integral rechargeable battery to provide full position monitoring for 20 hours when main power is removed.

The use of an extended SSI interface with the multiturn unit allows customer the option of programming of zero position and maximum rotation limits as well as resetting any error codes.

### General Specification

Supply Voltage	5Vdc
Output	SSI or 5V Analogue
Max. Rev. Count	1rev. single turn 32000rev. multi turn
Position retention	no limit single turn 20 hours multi turn
Resolution	±0.18°
Accuracy	±1.5°
Connector	10 Way Molex

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\* Due to saturation effects of the OPAMP output transistors the actual analogue response will be rounded towards the supply rails. i.e. the voltage will never quite reach 0V or 5V.

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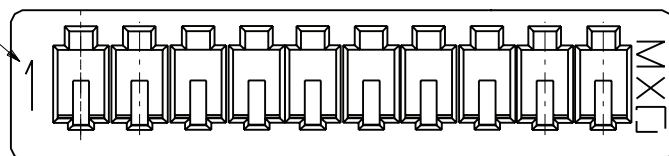
Issue 01



## Single turn encoder

Circuit 1	SSI Data out+
Circuit 2	SSI Data out-
Circuit 3	SSI Chip select+
Circuit 4	SSI Chip select-
Circuit 5	SSI Clock+
Circuit 6	SSI Clock-
Circuit 7	Factory only (leave open)
Circuit 8	Vin (5V)
Circuit 9	GND (0V)
Circuit 10	Analogue Output

Circuit number



## 10-bit Single turn Absolute Position over 16-bit Synchronous Serial Interface (SSI)

The serial data transmission for the single turn encoder makes use of 16-bits. The first 10-bits provide the position data, the final 6 bits provide status information and a parity check. The timing is outlined below.

**D9:D0** - absolute angular position data (MSB clocked out first)

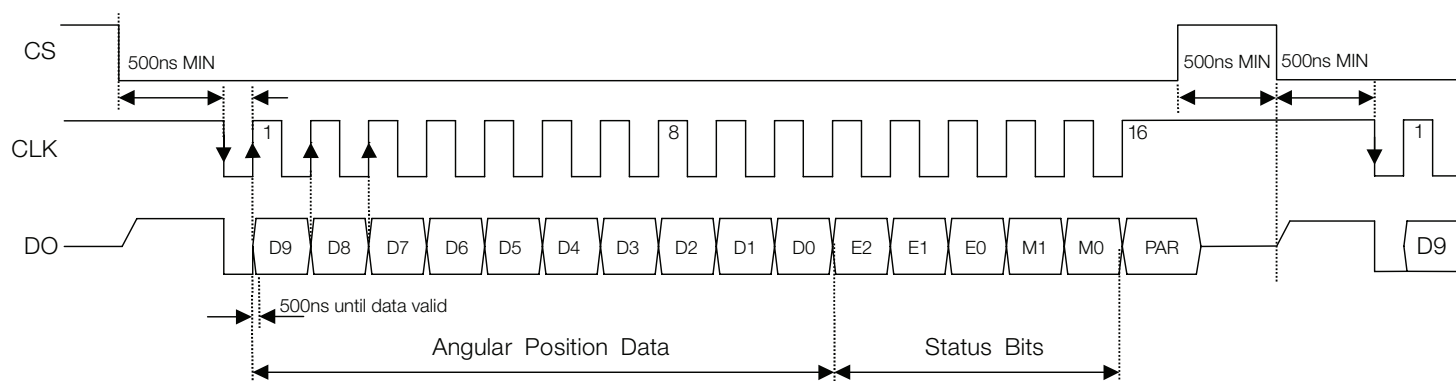
**E2** - high indicates valid positional data

**E1** - low indicates valid positional data

**E0** - low indicates valid positional data

**M1:M0** - if both these bits are 1 positional data not valid

**PAR** - bit to aid detection of transmission error. Transmission error if value of all bits is odd



The default condition of the Encoder is Chip select (CS) high, Clock (CLK) high, then the data out (DO) is set to tri-state. Setting the CS low initiates a position read. A minimum pause of 500ns is required before correct data is available, at this point the clock can start with the data being available from the first rising edge of the clock pulse (allowing for rise times). After the parity has been read the CS should be set high for a minimum of 500ns before repeating the sequence as required.

# Control of DC Motors

## Absolute Encoder

Issue 01

# Multi Turn Encoder Coming Soon

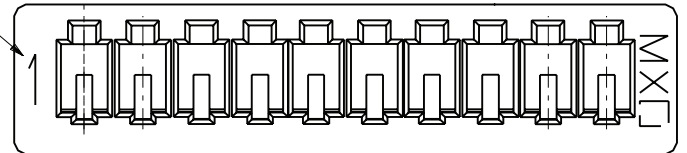
call +44 (0) 1460 72000



### Multi turn encoder

Circuit 1	SSI Data out+
Circuit 2	SSI Data out-
Circuit 3	SSI Data in+
Circuit 4	SSI Data in-
Circuit 5	SSI Clock+
Circuit 6	SSI Clock-
Circuit 7	Factory only (leave open)
Circuit 8	Vin (5V)
Circuit 9	GND (0V)
Circuit 10	Analogue Output

Circuit number



### 26-bit Multi turn Absolute Position over 32-bit Synchronous Serial Interface (SSI)

The multi turn absolute encoder makes use of an enhanced SSI interface to allow both the reception of position data and the sending of set up commands. Send and receive operate concurrently over a 32-bit clock pulse train.

#### Data out:

The first 16-bits provide the number of rotations, the next 10-bits provide the angular position data, there are two unused bits then the final 4 bits provide status information and a parity check. The timing is outlined below.

R25:R10 - number of rotations (MSB clocked out first)

A9:A0 - absolute angular position data (MSB clocked out first)

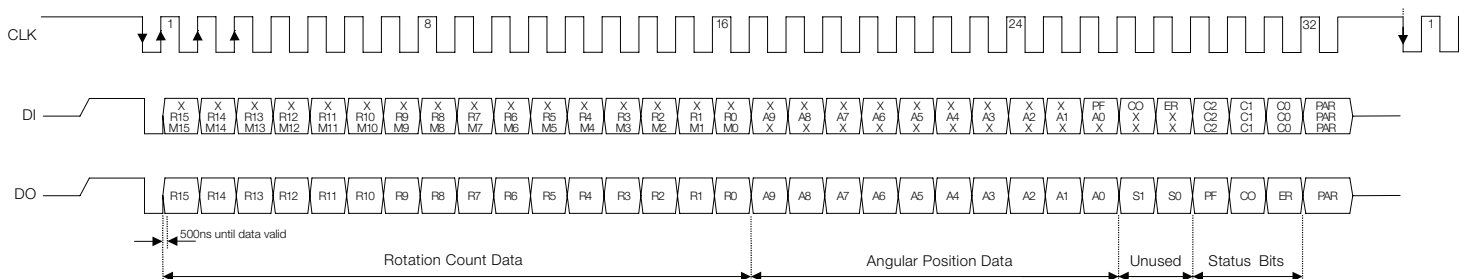
S1:S0 - unused, data should be ignored

PF - high indicates power has failed

CO - high indicates counter overflow

ER - low indicates valid positional data

PAR - bit to aid detection of transmission error. Transmission error if value of all bits is odd



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## Absolute Encoder

Issue 01



### 26-bit Multi turn Absolute Position over 32-bit Synchronous Serial Interface (SSI)

#### Data in:

The format of the setup data has 3 variants, the final 4 bits transferred are made up of a parity bit and 3 'command' bits. These 3 bits control the interpretation of the data that precedes them. The first 16-bits provide the number of rotations (either reset or maximum), the next 10-bits provide the angular reset position data and bits 4 to 6 provide the means to clear the error states indicated above. The table below outlines the various options.

31	24	20	16	12	8	4	0	
Rotation Count Value				Angle Value or Flags			C2:C0	PAR
<Ignored>				<Ignored>			000	PAR
<Ignored>				<Ignored>		PF CO ER	001	PAR
Reset Rotation Count Value [R15:0]				Reset Angle Value[A9:0]		<Ignore>	010	PAR
Maximum Rotation Count Value [M15:M0]				<Ignored>			011	PAR
<Ignored>				<Ignored>			1XX	PAR

R15:R0 - reset rotation count to this value (MSB clocked out first)

M15:M0 - maximum rotation count - effects CO and analogue output scaling (MSB clocked out first)

A9:0 - reset angle to this value (MSB clocked out first)

PF - write high to clear power failure error

CO - write high to clear counter overflow error

ER - write high to clear positional data error

PAR - bit to aid detection of transmission error. Transmission error if value of all bits is odd