RotaCol® - *Silverline*
'SPI' Interface Precision Digital Hall Contactless Rotary Position Sensors
Bush Mounting - Sleeve Bearing

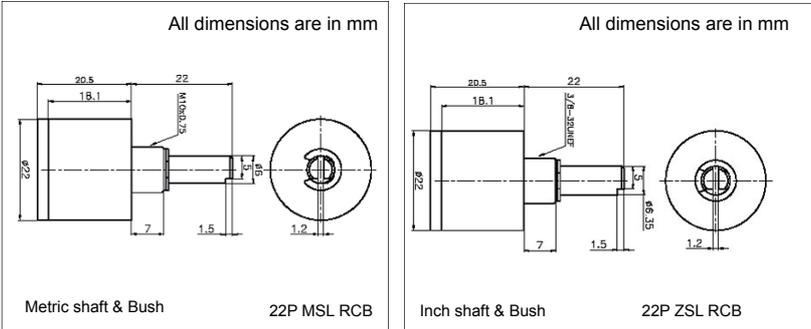**Series 22P MSL RCB**
Series 22P ZSL RCB

Economical Hall effect magnetic sensor
SPI - 3 wire - half duplex or 4 wire - full duplex
Direct SPI interface to microcontroller
Robust metal aluminium housing, 22 mm Ø housing
Bush mounting - sleeve bearing, Shock & vibration proof
Measurement range 0° - 360 °

1-Supply (Red) 2-Ground (Grey) 3-MOSI/ MISO (Grey) 4-Clock (Grey) 5-Chip select (Grey) : For 3 wire SPI
1-Supply (Red) 2-Ground (Grey) 3-Clock (Grey) 4-MOSI (Grey) 5-MISO (Grey) 6-Chip select (Grey) : For 4 wire

All dimensions are in mm — Metric shaft & Bush — 22P MSL RCB

All dimensions are in mm — Inch shaft & Bush — 22P ZSL RCB

For full range of Rotary Sensors refer -
www.rotacol.info/rotamec.pdf

FUNCTION PRINCIPLE
The angular position and the signal generation is detected by a CMOS Hall sensor over which a parallel diametrically polarized magnet induces a magnetic field. An integrated electronic provides the output of a 2 byte WORD with an SPI interface.

SERIAL PERIPHERAL INTERFACE
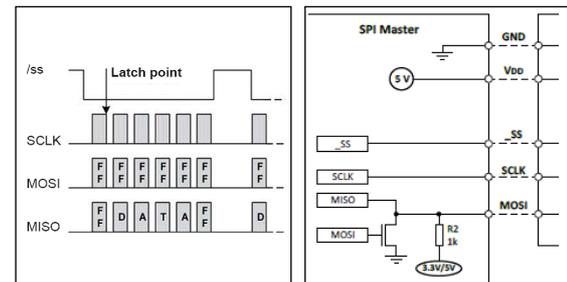
The serial peripheral interface (SPI) is a bus system for a serial synchronous data transmission between different integrated circuits.

A) For 3 wire SPI - The bus consists of 3 lines MOSI / MISO (one common line), SCLK - (Serial Clock, output from master) and SS Slave Select (active low; output from master).

B) For 4 wire SPI - The bus consists of 4 lines MOSI (Master Out Slave In), MISO (Master In Slave Out), SCLK - (Serial Clock, output from master) and SS Slave Select (active low; output from master).

By these signal lines the master selects the slave for communication. This is done because the master sets the SS line from high to low. The angular informations are calculated all 350 µs and are available for the master on demand. There is no fixed protocol for the SPI bus. Nevertheless many microcontroller IC`s have a SPI input. By programming this microcontroller IC many SPI suitable sensors can be managed by one microcontroller. Two channel redundant outputs can be provided.

Default Version : 22mm housing, bush mount, SPI interface,360° Electrical & Mechanical angle, Low Torque, 5 core flat cable 0.15 mtr long - 3 wire SPI / 6 core flat cable 0.15 mtr long - 4 wire SPI

ELECTRICAL CHARACTERISTICS

Electrical angle		0 - 360°
Electrical speed (Max.)		800 rpm
Resolution		14 bit (16383 steps)
Signal type	Supply voltage	Output signal
S05SPI	5V±10%	5V SPI - 3 wire
SE05SPI	5V±10%	5V SPI - 4 wire
SE33SPI	3.3V±10%	3.3V SPI - 4 wire
S05SPI2C	5V±10%	2 channel 5V SPI - 3 wire
Frequency response		5 KHz
Supply current		< 30 mA
Update rate		0.6 ms

MECHANICAL CHARACTERISTICS

Mechanical angle			360° (continuous)
Bushing	Metric	M10 X 0.75 (MSL)	
	Inch	3/8" X 32 UNEF (ZSL)	
Shaft diameter and length (FMS)	Metric	6mm Ø X 22 mm (MSL)	
	Inch	1/4" Ø X 22 mm (ZSL)	
Operating torque (approx.)			0.2 - 0.3 Ncm
Protection			IP 40
Operating temperature			- 40 to +85° C
Operating life (approx.)			15 million rotations
Mechanical speed (max.)			1000 rpm
Weight			22 gm
Interconnection			5 core flat cable 0.15 mtr long - 3 wire SPI
			6 core flat cable 0.15 mtr long - 4 wire SPI

MATERIAL

Housing with bushing	Anodized aluminium
Bearing	Sleeve bearing
Shaft	Stainless steel

ORDERING INFORMATION

Refer to electrical and mechanical options on page 2

Housing diameter	Serial peripheral interface (SPI)	Metric Silverline (Bush Thread M10X0.75 & Shaft Ø 6mm) / Inch Silverline (Bush Thread 3/8"X32 TPI & Shaft 1/4")	RotaCol	Bush mounting - sleeve bearing	Signal — 5V SPI - 3 wire / 5V SPI - 4 wire / 3.3V SPI - 4 wire / 2 channel 5V SPI - 3 wire	14 bit output	Without stop (default 360°)	Direction of rotation	Clockwise (default- for 3 wire SPI) Counter clockwise (default- for 4 wire SPI)	Programming options	Zero point	Special shaft length (default 22 mm)	Special cable length - only for OCF (default 0.15 mtr long)	Output connections	5/6 Core Flat cable (default) Terminal block Axial Terminal block Radial
22	P	MSL ZSL	RC	B	S05SPI SE05SPI SE33SPI S05PI2C	S14	O360		CW CCW	POZ		Axx	CVxx	OCxx	OCF OCTA OCTR
22	**P**	**xSL**	**RC**	**B**	**SxxSPI**	**S14**	**O360**	**CW / CCW**		**POZ**		**Axx**	**CVxx**	**OCxx**	

Example with description - **22P MSL RCB S05SPI S14 O360 CW POZ OCTR -** 22mm diameter, SPI interface, Metric Silverline (Bush Thread M10X0.75 / Shaft 6mm Ø), RotaCol, Bush mounting , 5V SPI output - 3 wire, 14 bit output, 360° clockwise, Zero point, Terminal block Radial

ELECTRICAL OPTIONS FOR SPI VERSION 22P MSL/ZSL RCB

RotaCol® are the latest development in rotational position sensors and contactless devices. Modern Hall IC's in combination with special magnets and RISC processors provide intelligent customizing of output signals and interfacing.
Not only precision potentiometer but also optoelectronical incremental and absolute encoders are replaced. The RotaCol® series is divided into 3 groups : analog types with analog output (replacement for precision potentiometer), incremental output (replacement of optoelectronic encoders), absolute digital SPI and SSI interface. Because of wide variety of mechanical and electrical options it is possible to use them in almost any automation and control application where rotary angular sensing is required. Regardless of the wide variety of existing technical features, the price is relative low.

SPI Bus Interface
The Serial Peripheral Interface bus or SPI bus is a synchronous serial data link standard developed by Motorola that operates in full duplex mode. One or more devices can communicate with one master. The length of the signal wire should not be longer than 0.5 mtr. To bridge larger distances it is recommended to use the SSI interface. The digital signal in 2 byte Grey code transmits the angular position information through the data bus.

Direction of Rotation (CW / CCW)
The default direction of rotation is clockwise (CW) for 3 wire SPI. It is also possible to change the direction of turning to counter clockwise mode (CCW). The default direction of rotation is counter clockwise (CCW) for 4 wire SPI. It is not possible to change the direction from counter clockwise (CCW) to clockwise (CW).

Zero Point Programming (POZ)
The electrical zero point is at the beginning of the signal rise. If a shaft marking is brought in line with the housing marking, the electrical zero point can be set to that position. In any case it is necessary to have a reference to the shaft marking.

2 Channel Redundant Output (2C) - Special type (only for 3 wire SPI)
2 Channel Output (2C) : The sensor provides 2 operating modes: A) Redundancy i.e. channel one and channel two are identical. If one channel fails the other channel remains active.B) It is also possible to have 2 different programs in the 2 channels. For this, additional functions can be obtained.

MECHANICAL OPTIONS FOR SPI VERSION 22P MSL/ZSL RCB

| Type / Series	Standard mechanical options	Customized mechanical options
22P MSL/ZSL RCB	Terminal Block axial or terminal block radial (OCTA / OCTR)	Special shaft length; Special cable length

INTERCONNECTIONS

Standard Interconnections - 5 core flat cable 0.15 mtr long - (for 3 wire SPI), 6 core flat cable 0.15 mtr long (for 4 wire SPI)

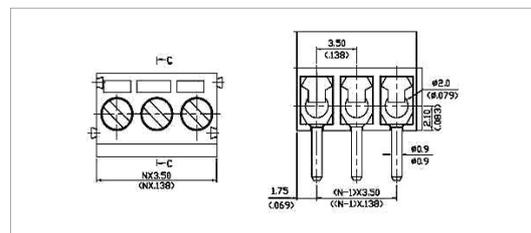### Other Interconnection options

Terminal block - Axial (OCTA)
Wires leaving axial to shaft axis

5 sockets (3 wire SPI)
6 sockets (4 wire SPI)
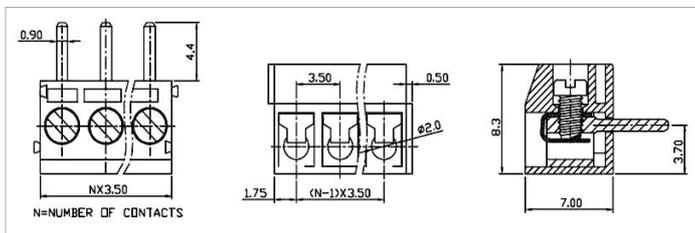
Terminal block - Radial (OCTR)
Wires leaving radial to shaft axis

5 sockets (3 wire SPI)
6 sockets (4 wire SPI)

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