NEWALL

Newall Measurement Systems

SHG-TS and SHG-VS

(Spherosyn Digital SP)

Linear Encoder

Single Point Protocol

SHG-TS and SHG-VS SERIES (SPHEROSYN DIGITAL SP) LINEAR ENCODER WITH SINGLE REFERENCE MARK

(Revision 07.18.08)

To be used in conjunction with SHG-TT (Spherosyn Digital) installation manual 023-80190-UK

Power Requirements	5Vdc +-5% < 85mA
Shock (11ms)	100g / 980m/s-2 (IEC 69-2-6)
Vibration (55-2000Hz)	30G / 294m/s-2 (IEC 68-2-27)
Ingress Protection Level	IP67
Operating Temperature Range	0 to 55 deg. C (32 to 131 deg. F)
Storage Temperature Range	-20 to 70 deg. C (-4 to 158 deg. F)
Scale Material	316 Grade Stainless Steel
Scale (Tube) OD	15.25mm (0.601")
Moving Force	20N
Standard Cable	9-core Cable with PUR
Max Cable Length	20m (65ft)
Cable Bend Radius (PUR)	Static: 12.7mm (0.5") Active: 50.8mm (2")
Cable Bend Radius with Armor	50.8mm (2")
Accuracy	+-10μm/meter
SCC-200 Compatibility	Yes (SHG-VS)

INTRODUCTION

The SHG-TS and SHG-VS (Spherosyn Digital-SP) scales have a series of selectable reference markers, to a maximum of 4, within the end section of the scale. Which reference is selected for output is dependent on the rotational alignment of the scale relative to the reader-head and will be discussed in more detail below. SHG-VS encoders are fully compatible with the operation of the SCC-200 converter where 1Vp-p signal is required.

MODE OF OPERATION.

The standard internal scale periodic reference mark is 'gated' using a logical 'AND' type operation with the signal from the head sensor triggered by the scale insert. The result is that only the internal periodic reference mark is allowed to propagate from the reader-head when both it and the magnet insert signal are both in the 'high/true' state.

In order to facilitate installation a head mounted LED has been included. The head LED is illuminated Green when the sensor has detected the magnet insert. It then changes to Red once the internal incremental reference mark, within the window defined by the scale insert, is detected. The LED then turns off once the external magnet is no longer detected. Thus the repeatability of the reference mark is within a single resolution count. See Figure 1.

Note: ***Under normal operation (other than at the index position) the LED is OFF.***

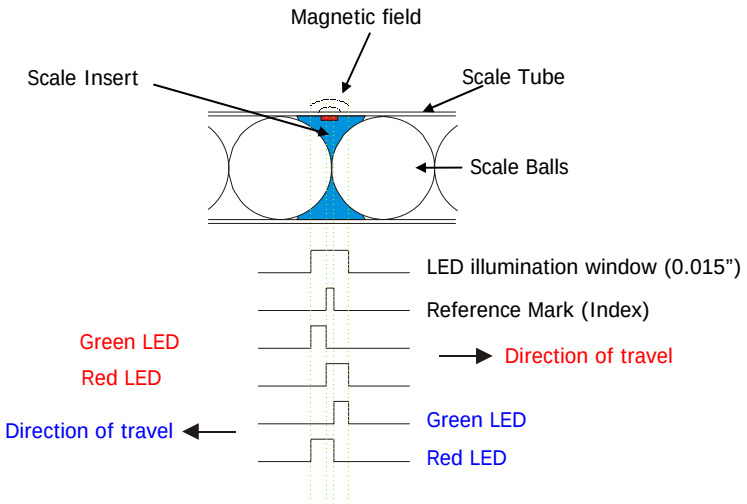


Figure 1. Operation of the head-mounted LED.

SCALE CONSTRUCTION

The scale is constructed with 4 inserts located at the non-adjusting end of the scale. The non-adjusting end of the scale has a white nylon screw. The adjusting end of the scale will have a red cap.

The sequence commences 5 balls in from the end of the scale (78.5mm/3.1") with the inserts then loaded 2 balls (25.4mm/1.00") apart and at 90^{o} incremental angles to each other (See Figure 2a,b). Thus, from the non-adjusting end of the scale, the last insert will appear at approximately 256.3mm/10.1" from the external extreme of the scale. For short scales the number of inserts is reduced accordingly.

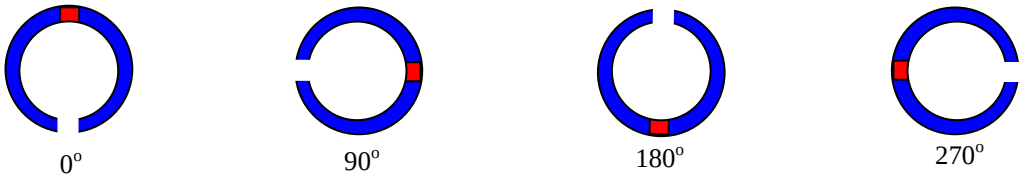


Figure 2a. Orientation of inserts within a scale

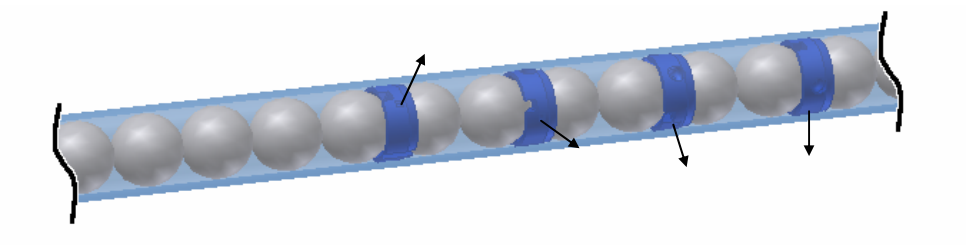


Figure 2b. Image showing rotation of inserts within a scale

Installation

- The position of the desired reference marker location should be identified prior to installation to ensure the scale can be mounted to meet this requirement. The index position is usually related to machine mechanical switches. The scale and reader-head should then be mounted mechanically in the standard way.

- Locate the reader head mechanically at the position where the reference marker is required ensuring again that this is within the coverage of the scale selectable reference marker positions.

- Rotate the scale until the head LED turns Green. If after one resolution this has not occurred move the scale longitudinally through the reader-head in either direction by approximately 2mm and repeat the procedure.

- Repeat the above procedure until the reference marker window is found.

- If the LED has turned Red or Green, rotate the scale about this point, backwards and forwards, until the rotation of the scale coincides with the mid point of the LED on/off cycle. The scale is now axially aligned with the reader-head.

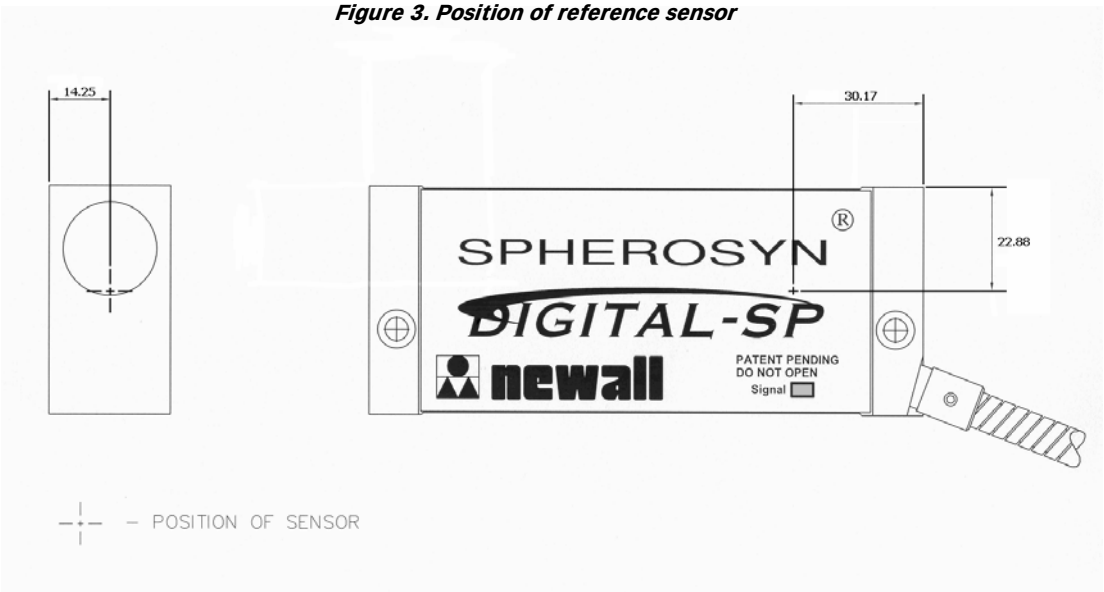
- If the LED is Green then the index position longitudinally is within approximately ±2mm of the current head position. In most circumstances this will be sufficient. If fine placement is required then the scale should be moved longitudinally until the LED turns Red. It is at this transition point that the index output will occur. (See Figure 1.) If the LED turns off and not to Red then move the scale in the opposite direction as you have moved away from the index position.

- The installation alignment is now complete and the scale should be secured at the mounting points to prevent any future movement.

- As the reader-head passes over the reference marker (in either direction – see Figure 1) the LED will flash Green then Red.

The scale is reversible within the reader-head and as such can be swapped end for end. As the sensor within the reader-head is not centrally located with respect to its body length, this can have an effect on which index marker is selected or the preferred orientation (end-for-end) of the scale. If the reader head cable is closest to the non-adjusting end of the scale, 4 reference markers can be obtained. If the reader head cable is closest to the adjusting end of the scale, 2 reference markers can be obtained. See Figure 3 for position of sensor within the reader-head envelope.

Figure 3. Position of reference sensor



MAGNETIC FIELDS

The magnetic field generated by the scale inserts is in the order of 100 Gauss (at the scale surface) and as such will not attract swarf or anything but the finest ferrous dust particles.

However, if the reader-head is subjected to strong magnetic fields this may 'enable' the head sensor and as such allow the incremental index marks to propagate from the encoder. Consequently, it is important to ensure during installation that any stray magnetic fields are minimised in order to prevent false operation. In the worst case, a field of 30 Gauss at the encoder surface could result in false operation.

Providing magnetic shielding by mounting on a steel plate would greatly improve the encoder's robustness to stray magnetic fields.

GENERAL INFORMATION

The reader-head and scale are not matched pairs but obviously an SHG-TS or SHG-VS encoder reader-head can only work with a scale configured for this type of operation. If an SHG-TS or SHG-VS reader-head is combined with an SHG-TT scale NO reference marks will be output. Conversely, an SHG-TS or SHG-VS scale with an SHG-TT reader head will result in the standard periodic reference marks being output.

NEWALL MEASUREMENT SYSTEMS

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Issue Date: July 2008