evoDUAL User Manual

REVISION: 1.0

DATE: 20 May 2025

evoSonic Pty Ltd
1/2A Myer Ct

Beverley 5009 Australia

www.evoSonic.ai

Contents

1 Introduction

This manual is designed to provide the user with details of the operational aspects and correct use of the evoDUAL encoder.

All users, regardless of experience level are encouraged to read this manual in its entirety before first use.

2 Product Overview

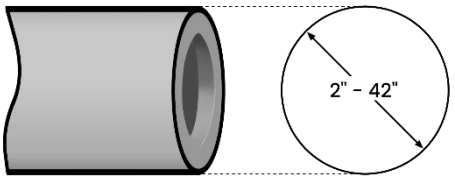
evoDUAL is a patented, innovative, first of kind, non-contact circumferential encoder designed to attach to and integrate with common industrial probes.

The core features are as follows:

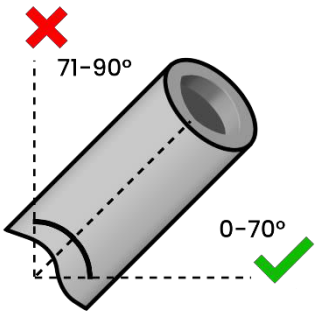
- Circumferential non-contact encoding combined with a linear encoder for simultaneous 2-axis encoding.
- Onboard LEDs to indicate approaching and true cardinal clock positions (12, 3, 6, 9 o'clock).
- Eliminates the need to mark-up scan lines on pipelines, vessels and curved structural assets.
- Eliminates multiple acquisition initiation points at commencement of scanning runs.
- Enables uninterrupted scanning around appurtenances (partial test restrictions) such as nozzles, nodes, supports, stands, saddles, reinforcement pads and penetrations.
- Replaceable (non-integrated) cable.

3 Product Applications and Limitations

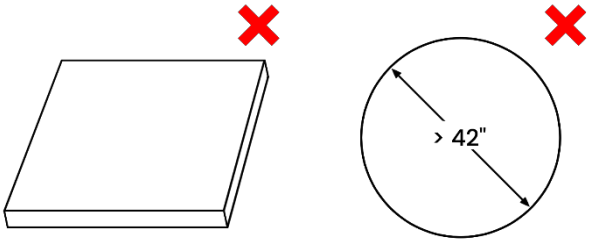
The evoDUAL is intended for use on cylindrical or curved subjects (pipes/vessels/curved structures) of diameter 2" (51mm) to 42" (~1050mm).



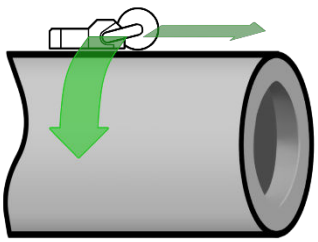
The evoDUAL is ***limited*** for use on cylindrical or curved subjects (pipes/vessels/curved structures) oriented from horizontal to 20° from vertical



lThe evoDUAL is ***not*** intended for use on flat subjects (plate) cylindrical or curved subjects (pipes/vessels/curved structures) of diameter > 42" (~1050mm).



The evoDUAL encodes in the circumferential (X) direction and the longitudinal direction (Y).



4 Specifications

4.1 General Specifications

Dimensions (mm)	117 x 57 x 35mm
Weight	168g
Power Requirement	5V
Storage Temperature Range	-40°F to 185°F (-40°C to 85°C)
Operating Temperature Range	-5°F to 140°F (-15°C to 60°C)
Encoding Channel	Longitudinal Encoder Channel: Encoder 1 Circumferential Encoder Channel: Encoder 2
Encoding Type	Quadrature for both Encoder 1 & 2

4.2 Circumferential Encoder Resolution

Diameter (mm)	Resolution (Steps per mm)[1]	Resolution (mm)[2]
60.3	76.01	0.013
88.9	51.56	0.019
114.3	40.10	0.025
168.3	27.24	0.037
323.9	14.15	0.071
610	7.51	0.13
762	6.02	0.17
900	5.03	0.20
1067	4.29	0.23

Diameter (inch)	Resolution (Steps per inch)[1]	Resolution (inch)[2]
2	1931	0.00052
3	1309	0.00076
4	1019	0.00098
6	692	0.0014
12	359	0.0028
24	191	0.0052
30	153	0.0065
36	127	0.0077
42	109	0.0092

Calibration Formula

$$\frac{Ticks}{mm/IN} = \frac{4583}{Diameter_{outer}}$$

Note: This applies for both Metric and Imperial Units. Use actual outer diameter values for pipe sizes

4.3 Longitudinal Encoder Resolution

Encoder ticks per revolution: 1024

Wheel Diameter: 38mm

Resolution: 9.87ticks/mm

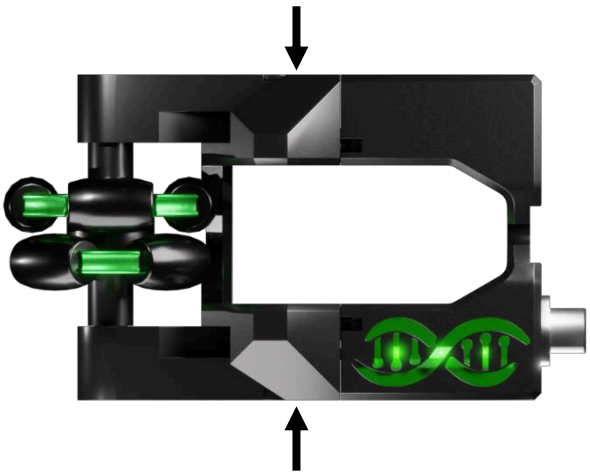
$$\frac{Steps}{mm} = \frac{1024\ (\text{Steps per revolution})}{\pi * Diameter_{Wheel}}$$

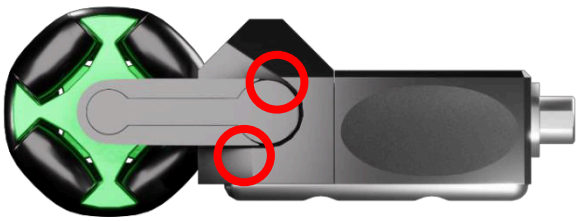
5 SAFETY CONSIDERATIONS

5.1 General

The front wheel assembly can be removed and replaced as needed (See 10.3). Appropriate safety considerations should be taken for the tools used in this process.

The front wheel assembly also contains two pinch points at the base of each arm. Care should be taken when placing fingers at these points.





6 Disclaimer

While every effort has been made to ensure the accuracy and currency of the information in this manual, evoSonic Pty Ltd reserves the right to make changes without prior notice. Users should verify critical information before use where applicable.

evoSonic Pty Ltd is not responsible for errors in this manual or for any incidental, indirect, or consequential damages arising from the supply or use of this manual or associated equipment. This manual is provided "as is" without warranties of any kind, express or implied, including, but not limited to, implied warranties of merchantability and fitness for a particular purpose. Unauthorized reproduction, in whole or in part, constitutes a copyright infringement and is strictly prohibited.

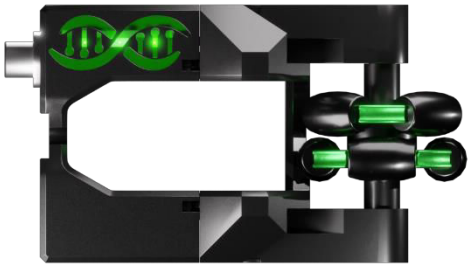
While every attempt is made to ensure that the information contained within this manual is valid and up to date, the information is subject to change without notice and any information with critical dependencies should be verified before use.

Unauthorized reproduction in whole or in part is an infringement of copyright.

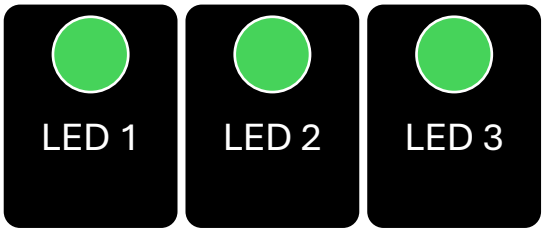
For product warranty information, please visit: https://evosonic.ai/warranty/

For EULA information please visit https://evosonic.ai/eula

7 Parts List

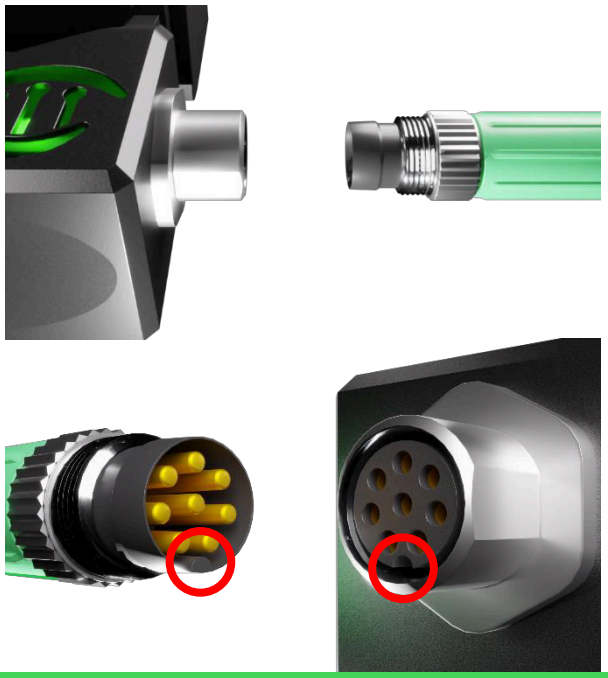
Part	Picture
evoDUAL Encoder Part No. (00983)	
evoDUAL M8 Encoder Cable Part No (01052)	

8 evoDUAL encoder cardinal LEDs

Cardinal	Picture
The evoDUAL encoder has three (3) distinct LED lights to indicate circumferential positioning	
Single central LED illumination (LED 2) < 0.5° off cardinal position (3, 6, 9, 12 o'clock)	
Dual LED illumination (LED 1&2 or 2&3) ≥0.5° and <2° off cardinal position (3, 6, 9, 12 o'clock)	
Single off-center LED illumination (LED 1 or 3) ≥2° and <5° off a cardinal position (3, 6, 9, 12 o'clock)	

9 evoDUAL – Installation & Setup

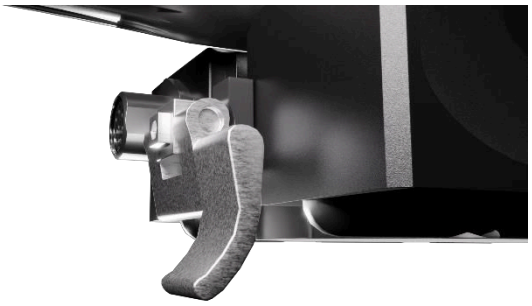
9.1 Connecting evoDUAL encoder

Step 1	Picture
Plug M8 encoder cable into the evoARC Dual. Ensure that the indexing notch lines up with the socket.	

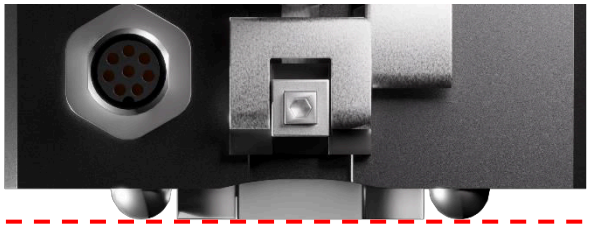
Step 2	Picture
Plug encoder cable (LEMO 16 pin male end) into pulser unit / PA set.	

9.2 Installing Probe into evoDUAL Encoder

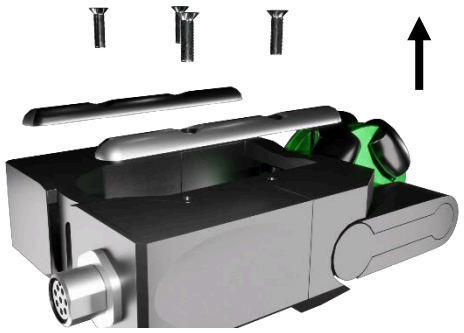
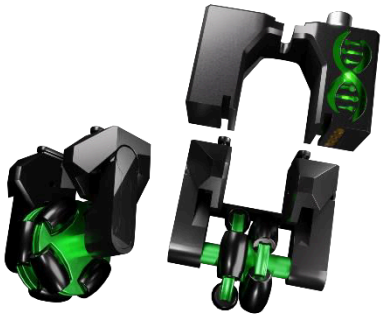
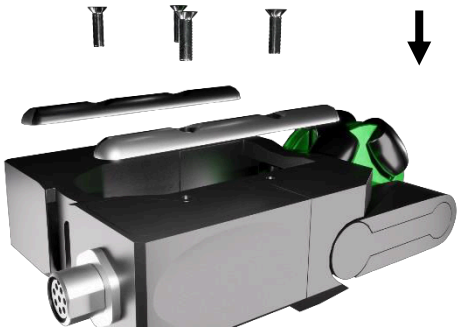
Step 1	Picture
Slide the probe into the DUAL, ensuring that the clamp slots into the channel in the rear of the encoder.	

Step 2	Picture
Tighten the screw on the back of the clamp.	

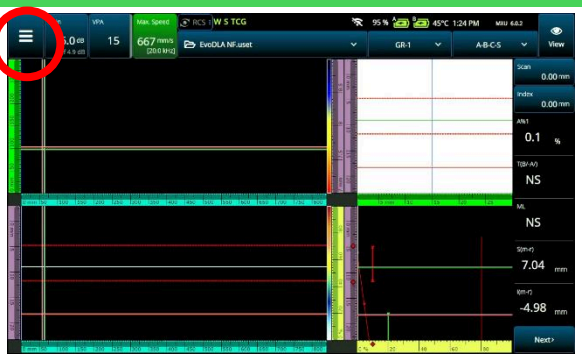
Step 3	Picture
Flip up the cam lever to fully secure the probe in place. Loosen the screw if the lever cannot be lifted.	

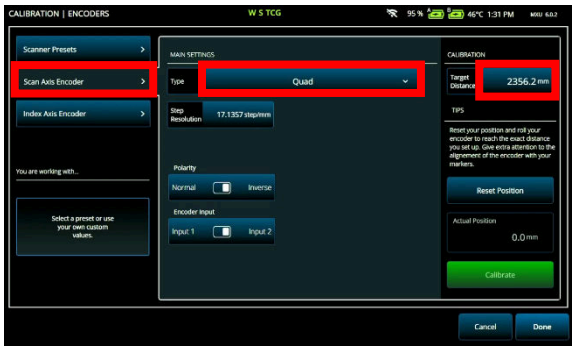
Step 4	Picture
Ensure that the probe is properly installed before use. Ensure that the wedge and hard guides are sitting flat and flush on the test object together.	

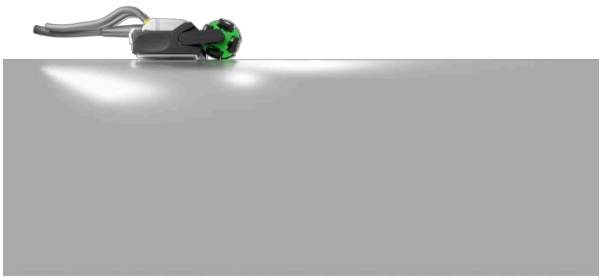
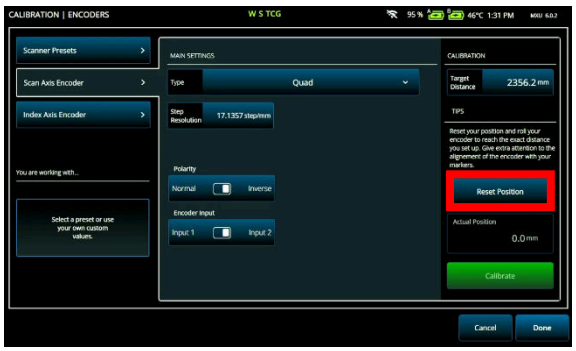
9.3 Replacing the Front Wheel Assembly

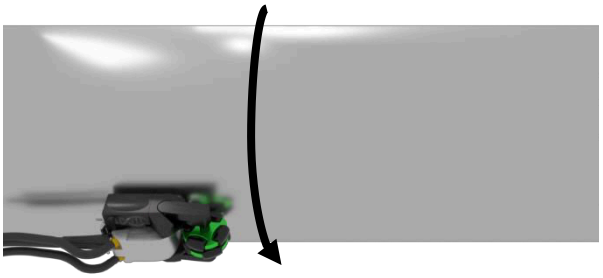
Step 1	Picture
Unscrew the hard guides under the DUAL and remove them.	
Step 2	Picture
Slide down the front wheel assembly	
Step 3	Picture
Install the new assembly	
Step 4	Picture
Replace the hard guides	

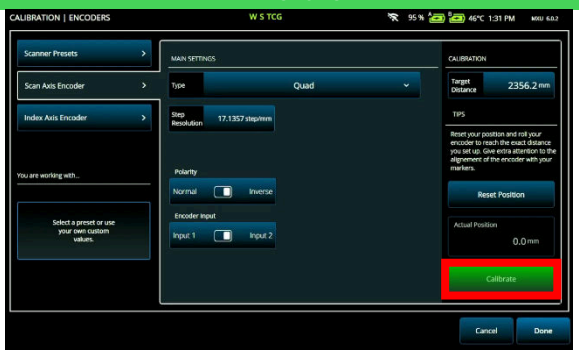
9.4 Calibrating the encoder on the X4

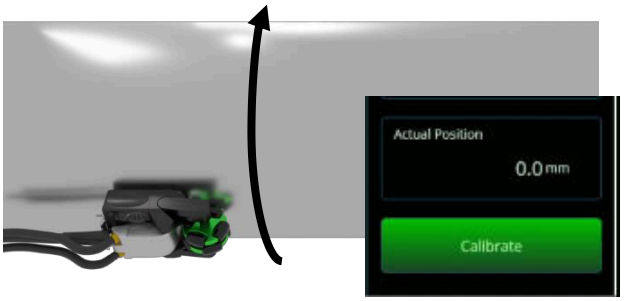
Step 1	Picture
On the X4, go to [Scan Plan] > [Scanning] > [Edit Encoders...]. Select [Default Settings] as the scanner preset.	

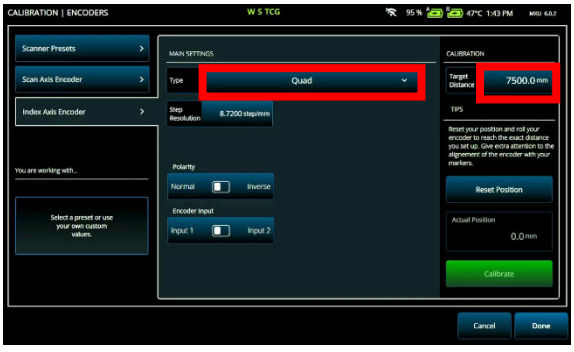
Step 2 – Scan Axis	Picture
Measure the circumference of the pipe to be scanned and mark a zero point datum. On the X4, select the [Scan Axis Encoder] and set the target distance to the circumference. Ensure that the [Type] is set to quad.	

Step 3– Scan Axis	Picture
Line up the probe on the top of your pipe until the DUAL only illuminates the centre LED. Ensure that the DUAL is parallel to the direction of the pipe, then reset the position on the X4.	 

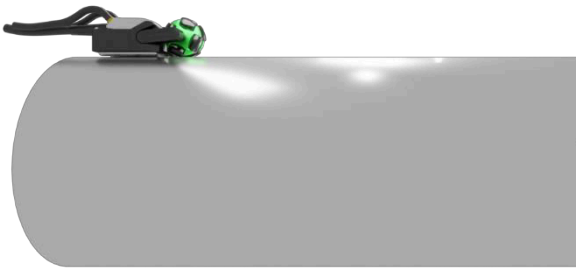
Step 4 – Scan Axis	Picture
Slide the DUAL around the circumference of the pipe until it reaches the beginning point. Keep it as parallel as possible. The encoder will illuminate only the centre LED at each quarter of the circumference.	

Step 5 – Scan Axis	Picture
Hold the DUAL in place and calibrate it on the X4.	

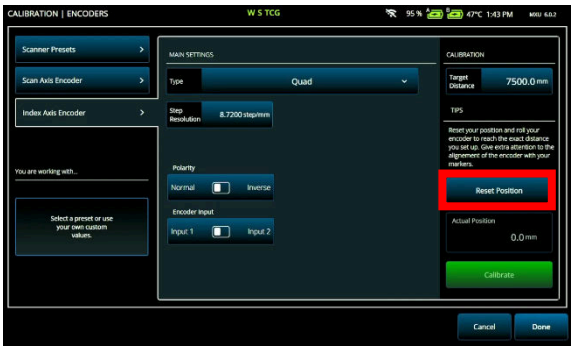
Step 6 – Scan Axis	Picture
Check the calibration by moving the DUAL back to the initial position. The position should read ~0.0mm on the X4	

Step 7 – Index Axis	Picture
Measure the distance of the pipe to be scanned from the zero point datum. On the X4, select the [Index Axis Encoder] and set the target distance to the length measured. Ensure that the [Type] is set to quad.	

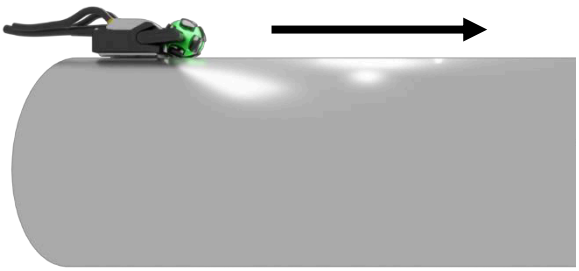
Step 8 – Index Axis	Picture



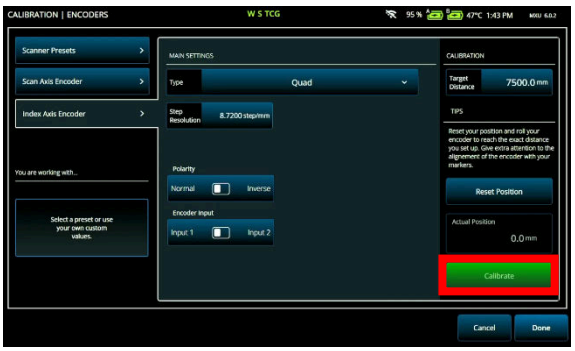
Move the DUAL to the zero point on the pipe, then reset the position.



Step 9 – Index Axis	Picture



Move the DUAL to the end of the pipe position then calibrate.



Step 10 – Index Axis	Picture
Check the calibration by moving the DUAL back to the starting position, the reading for the position should read as 0.0”	

9.5 Table of common pipe sizes

- Set resolution using the below table or conduct encoder calibration as per pulser unit / PA set guidance documentation.

Nominal Pipe Size mm (in)	Outside Diameter mm (in)	Steps/mm	Steps/in
50 (2)	60.33 (2.375)	76	1931
65 (2 ½)	73.02 (2.875)	62.77	1594
80 (3)	88.9 (3.5)	51.56	1310
90 (3 ½)	101.6 (4)	45.11	1146
100 (4)	114.3 (4.5)	40.1	1019
125 (5)	141.3 (5.563)	32.44	824
150 (6)	168.27 (6.625)	27.24	692
200 (8)	219.08 (8.625)	20.92	531
250 (10)	273 (10.75)	16.79	426
300 (12)	323.8 (12.75)	14.15	359
350 (14)	355.6 (14)	12.89	327
400 (16)	406.4 (16)	11.28	286
450 (18)	457 (18)	10	255
500 (20)	508 (20)	9	229
550 (22)	559 (22)	8.2	208
600 (24)	610 (24)	7.51	191
650 (26)	660 (26)	6.94	176
700 (28)	711 (28)	6.45	164
750 (30)	762 (30)	6.02	153
800 (32)	813 (32)	5.64	143
850 (34)	864 (34)	5.31	135
900 (36)	914 (36)	5.01	127
950 (38)	965(38)	4.75	121
1000 (40)	1016 (40)	4.51	115
1050 (42)	1067	4.3	109

Table 1 - Steps/mm & Steps/in for common pipe diameters

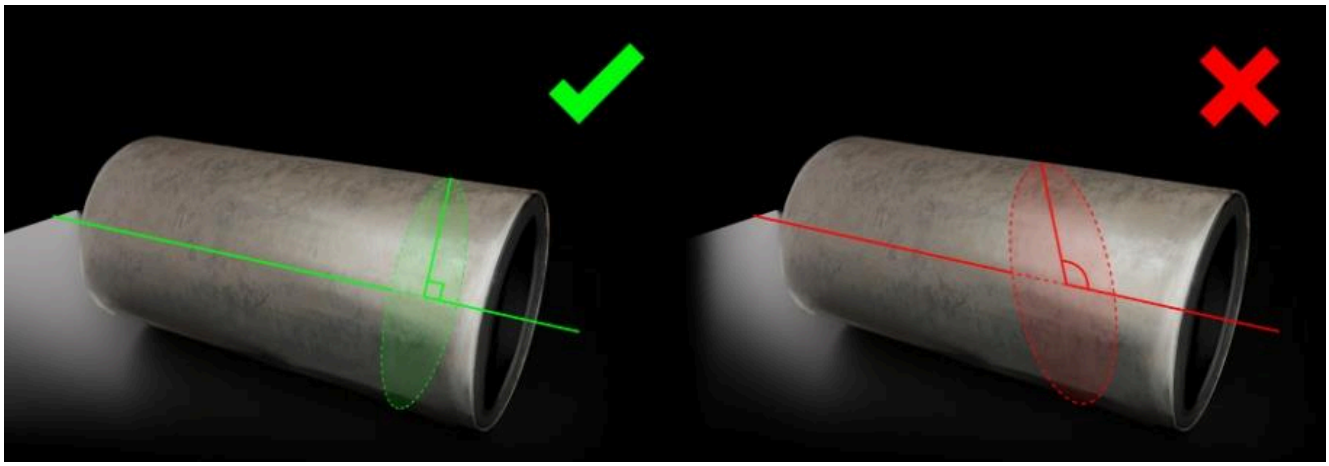
10 Scanning Procedure

10.1 Starting Position

- Place scanner at assigned or known starting position, for example 12 o'clock position (pipe top dead center) using the central cardinal LED as an indicator as per section 9 of this manual.
- Mark position on item to indicate datum / starting position.
- 'Zero' pulser unit / PA set.

10.2 Scanning

- For greatest accuracy, circumferential scanning should be performed in an arc as close as possible to perpendicular to the pipe axis.



- 12 o'clock position should be verified every three full rotations or as noted in relevant procedure.

11 General Maintenance

11.1 Pre-Start Checks:

- Check evoDUAL plug and LEMO encoder cable for damage or debris, clean as required.
- With the encoder plugged in and powered, cardinal LED lights are operating correctly by rotating encoder through 360° checking for illumination at 90°, 180°, 270° and 360° (3, 6, 9, 12 o'clock)

11.2 Post Scanning:

- Check evoDUAL plug and LEMO encoder cable for damage or debris, clean as required.
- Check moving parts and ensure that the movement is still smooth, clean and lubricate with silicon spry as required.

12 Pin out for plugs

PIN	Signal	Description	Level
1	NC		
2	+5VDC	Power Supply	+5VDC
3-8	NC		
9	PhA1	Encoder 1-A	TTL
10	PhA2	Encoder 1-B	TTL
11	PhB1	Encoder 2-A	TTL
12	PhB2	Encoder 2-B	TTL
13-15	NC		
16	GND	Ground	0VDC

13 More Information

For more information on this product, please scan the QR code below

evosonic.ai/productsupport/evoarc-support/

For product warranty information, please scan the QR code below

evosonic.ai/warranty/

14 Copyright

15 EMC Compliance

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to the housing or cabling not expressly approved by evoSonic may void the users authority to operate the equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.