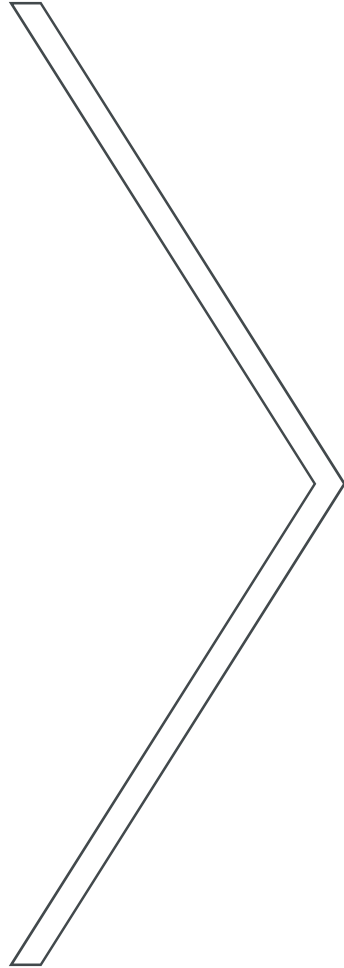


LMS4000 - Transform of the coordinate system

Tutorial



Transform of the coordinate system



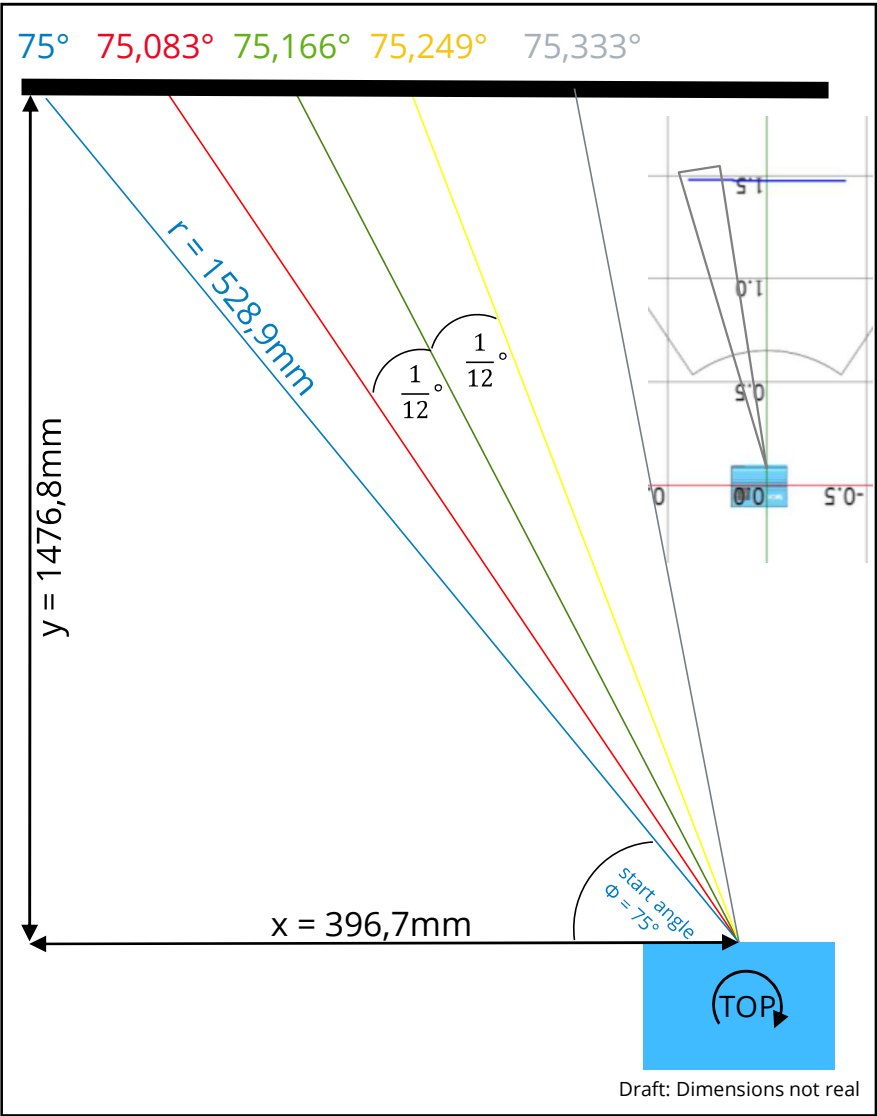
What you get: In this tutorial, we'll show you how to transform the received measurement data into a height profile at the example of LMS4000 .

What you need: To accompany this tutorial we recommend:

- LMS4000 incl. wiring
 - SOPAS ET Terminal.
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Transform of the coordinate system

From polar (r, Φ) to cartesian (x, y) at the example of LMS4000 (fixed angular resolution of 1/12°)



Example of a ColaB telegram with distance data:

	(start angle)				
Data from LMDscandata (r_{polar} in mm):	<3b><b9>	<3b><b4>	<3b><ad>	<3b><a5>	<3b><a0>
Converted to Millimeter (r_{polar} in mm):	1528,9	1528,4	1527,7	1526,9	1526,4
angle calculation $start\ angle + \left(\frac{1}{12}^\circ * n\right)$	$75^\circ + \left(\frac{1}{12}^\circ * 0\right)$	$75^\circ + \left(\frac{1}{12}^\circ * 1\right)$	$75^\circ + \left(\frac{1}{12}^\circ * 2\right)$	$75^\circ + \left(\frac{1}{12}^\circ * 3\right)$	$75^\circ + \left(\frac{1}{12}^\circ * 4\right)$
implicit angle information (Φ_{polar} in degree)	75	75,083	75,166	75,249	75,333°
Converted to Cartesian ($y_{cartesian}$ in mm)	1476,8	1476,9	1476,8	1476,6	1476,7
Converted to Cartesian ($x_{cartesian}$ in mm)	396,7	393,4	391,1	388,7	386,5

Values vary due to the statistical error (noise)

Example of calculating the polar distance:

<3b> <b9> $\xrightarrow{Uint_16()}$ 3BB9 (hex; Uint_16) $\xrightarrow{HextoDec}$ 15289 (dec; Uint_16) $\xrightarrow{\text{use divider of 10 to convert to mm}}$ 1528,9mm

Example of transforming the polar (r, Φ) coordinates to cartesian (x, y) coordinates:

(There may be some other approaches which fit better to your computing platform)

$$y_{cartesian} = \sin\left(\Phi_{polar} + \left(\frac{1}{12}^\circ * n\right)\right) * r_{polar} = \sin\left(75^\circ + \left(\frac{1}{12}^\circ * 0\right)\right) * 1528,9\text{mm} = 1476,8\text{mm}$$

$$x_{cartesian} = \cos\left(\Phi_{polar} + \left(\frac{1}{12}^\circ * n\right)\right) * r_{polar} = \cos\left(75^\circ + \left(\frac{1}{12}^\circ * 0\right)\right) * 1528,9\text{mm} = 396,7\text{mm}$$

Values symmetrically rounded

Further Information:

LMDscandata @ Youtube: <https://www.youtube.com/watch?v=iYuaDGqycOE>

LMDscandata @ SupportPortal: <https://supportportal.sick.com/tutorial/Scan-data-telegram-Content-and-parameters/>