MEM-BUS ABSOLUTE ENCODER

EtherNet/IP™

Application examples

MEM620-Bus MEM520-Bus MEM540-Bus MEM440-Bus MEM450-Bus

ODVA CONFORMANT

CIP Sync

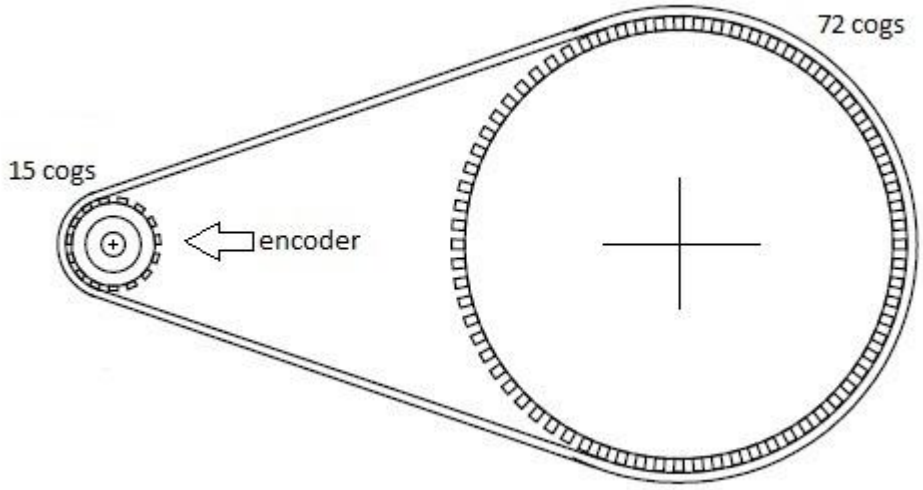
elap ELAP VIA VITTORIO VENETO, 4 · I-20094 CORSICO (MI) · TEL. +39.02.4519561
FAX +39.02.45103406 · E-MAIL INFO@ELAP.IT · SITE WWW.ELAP.IT

CONTENTS

Applications with ELAP encoder

ELAP encoder supports the function for round axes.
The output position value is adjusted with the zero point correction, the counting direction set and the parameters entered.

Example 1: Angle position measurement on a rotary table with mechanical ratio 72 / 15 = 4.8



The angle position of a table rotating around 360 degrees is to be controlled. The system mechanical ratio is 72 / 15.

It is:

Total Measuring Range = 360 degrees

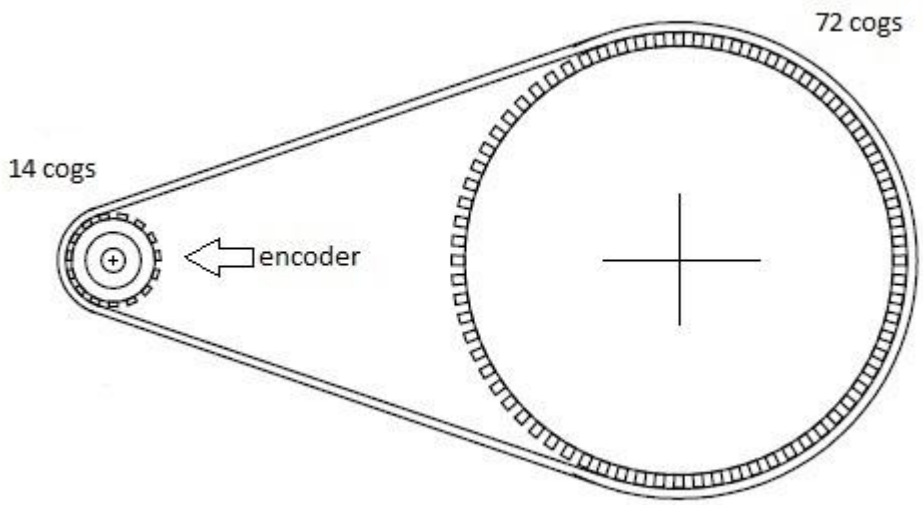
Number of distinguishable revolutions = 72 / 15 = 4.8

Measuring Units per Span = Total Range / Number of Revolutions = 360 / (72 / 15) = 75 degrees

Name	Value	Force Mask	Style	Data Type	De
Encoder1:C	{...}	{...}		_0580:MEM_BUS...	
Encoder1:C.Measuring_Units_per_Span	75		Decimal	DINT	
Encoder1:C.Total_Measuring_Range	360		Decimal	DINT	
Encoder1:C.Direction_Counting_Toggle	0		Decimal	BOOL	
Encoder1:C.Scaling_Function_Control	1		Decimal	BOOL	
Encoder1:C.Velocity_Format	16#1f04		Hex	INT	
Encoder1:C.Position_Low_Limit	0		Decimal	DINT	
Encoder1:C.Position_High_Limit	536870912		Decimal	DINT	
Encoder1:C.Minimum_Velocity_Set_point	-2147483648		Decimal	DINT	
Encoder1:C.Maximum_Velocity_Set_point	2147483647		Decimal	DINT	

NOTE: The scaling function control shall be enabled by setting '1' in the corresponding parameter.

Example 2: Angle position measurement on a rotary table with mechanical ratio 72 / 14 = 5.142857143.



The angle position of a rotating table around 360 degrees, is to be controlled. The system mechanical ratio is 72 / 14.

It is:

Total Measuring Range = 360 degrees

Number of distinguishable revolutions = 72 / 14 = 5.142857143

Measuring Units per Span = Total Range / Number of Revolutions = 360 / (72 / 14) = 70 degrees

Name	Value	Force Mask	Style	Data Type	D
Encoder1:C	{...}	{...}		_0580:MEM_BUS...	
Encoder1:C.Measuring_Units_per_Span	70		Decimal	DINT	
Encoder1:C.Total_Measuring_Range	360		Decimal	DINT	
Encoder1:C.Direction_Counting_Toggle	0		Decimal	BOOL	
Encoder1:C.Scaling_Function_Control	1		Decimal	BOOL	
Encoder1:C.Velocity_Format	16#1f04		Hex	INT	
Encoder1:C.Position_Low_Limit	0		Decimal	DINT	
Encoder1:C.Position_High_Limit	536870912		Decimal	DINT	
Encoder1:C.Minimum_Velocity_Set_point	-2147483648		Decimal	DINT	
Encoder1:C.Maximum_Velocity_Set_point	2147483647		Decimal	DINT	

NOTES:

The scaling function control shall be enabled by setting '1' in the corresponding parameter.

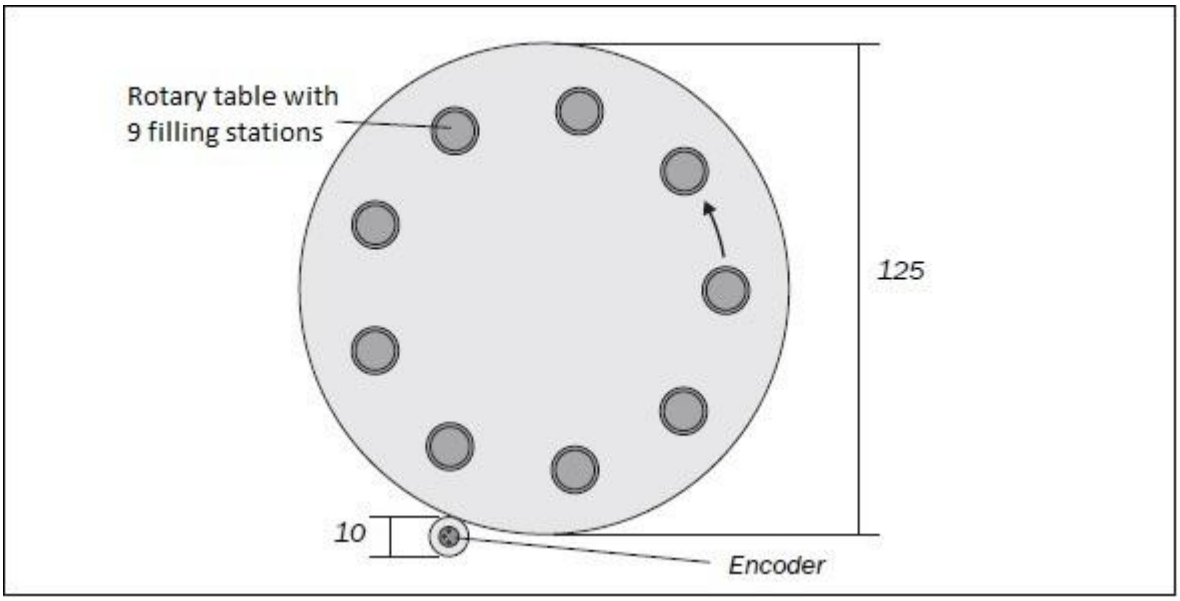
For higher resolution (1/10 degree), the parameter values can be multiplied by 10.

- *Total Measuring Range = 3600*
- *Measuring Units per Span = 700*

The mechanical ratio must be invariant

72 / 14 = 360 / 70 = 3600 / 700 = 5.142857143

Example 3: Position measurement on a rotary table.



A rotary table for a filling system is to be controlled. The resolution per devolution is defined by the number of filling stations, that are 9. The distance between two filling stations is 1000 encoder steps. The number of revolutions is defined by the transmission ratio = 12.5 of the rotary table gearing.

It is:

Total Measuring Range = 9 x 1000 = 9000 steps

To be realized in 12.5 revolutions of the encoder.

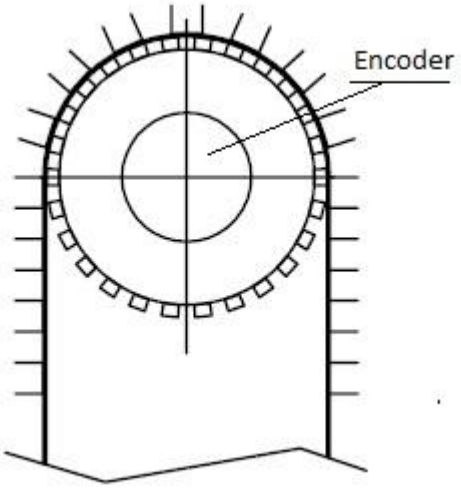
Therefore:

Measuring Units per Span = Total Measuring Range/Number of Revolutions = 9000/12.5 = 720 steps

Name	Value	Force Mask	Style	Data Type	De
Encoder1:C	{...}	{...}		_0580:MEM_BUS...	
Encoder1:C.Measuring_Units_per_Span	720		Decimal	DINT	
Encoder1:C.Total_Measuring_Range	9000		Decimal	DINT	
Encoder1:C.Direction_Counting_Toggle	0		Decimal	BOOL	
Encoder1:C.Scaling_Function_Control	1		Decimal	BOOL	
Encoder1:C.Velocity_Format	16#1f04		Hex	INT	
Encoder1:C.Position_Low_Limit	0		Decimal	DINT	
Encoder1:C.Position_High_Limit	536870912		Decimal	DINT	
Encoder1:C.Minimum_Velocity_Set_point	-2147483648		Decimal	DINT	
Encoder1:C.Maximum_Velocity_Set_point	2147483647		Decimal	DINT	

NOTE: The scaling function control shall be enabled by setting ‘1’ in the corresponding parameter.

Example 4: Position measurement for a wrapping machine.



The encoder is fixed on a wheel with 26 cogs; the distance between two consecutive cogs is just 1 inch (25.4 mm). There is a tray, for picking up objects, every 6 cogs . The ratio between *Total Measuring Range* and *Measuring Units per Span* is 6 / 26 = 0.23076923.

Since 1 inch = 25.4 mm, it is:

Measuring Units per Span = 26 x 254 = 6604 mm/10
Total Measuring Range = 6 x 254 = 1524 mm/10

Name	Value	Force Mask	Style	Data Type	De
Encoder1:C	{...}	{...}		_0580:MEM_BUS...	
Encoder1:C.Measuring_Units_per_Span	6604		Decimal	DINT	
Encoder1:C.Total_Measuring_Range	1524		Decimal	DINT	
Encoder1:C.Direction_Counting_Toggle	0		Decimal	BOOL	
Encoder1:C.Scaling_Function_Control	1		Decimal	BOOL	
Encoder1:C.Velocity_Format	16#1f04		Hex	INT	
Encoder1:C.Position_Low_Limit	0		Decimal	DINT	
Encoder1:C.Position_High_Limit	536870912		Decimal	DINT	
Encoder1:C.Minimum_Velocity_Set_point	-2147483648		Decimal	DINT	
Encoder1:C.Maximum_Velocity_Set_point	2147483647		Decimal	DINT	

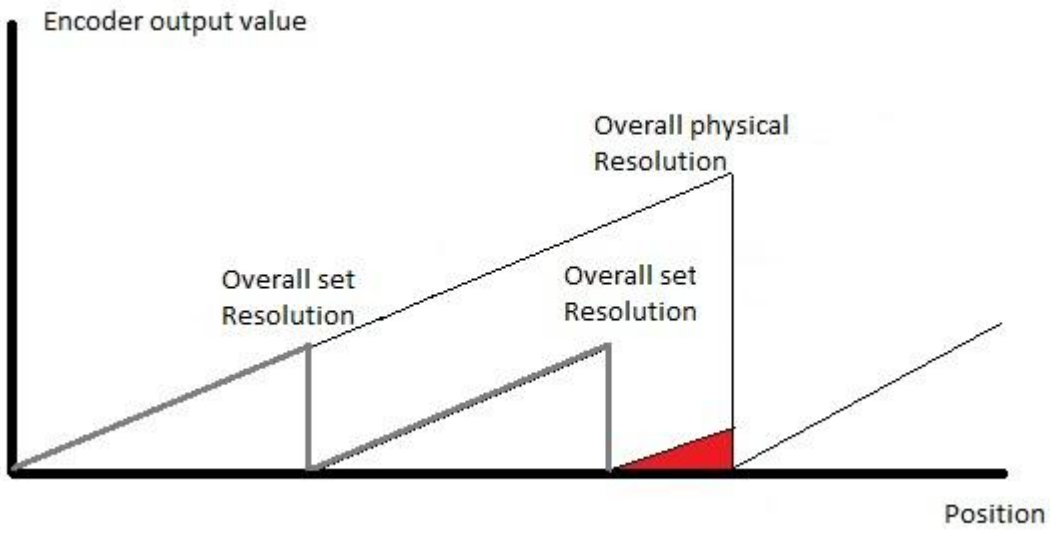
NOTE: The scaling function control shall be enabled by setting ‘1’ in the corresponding parameter.

Move the first collecting tray is in the right position, then reset the encoder counter. The encoder output value will run from 0 to 152.4 mm (which corresponds to 6 cogs of the wheel) in endless mode.
When the output value is 0, a new tray is in position.

The mechanical ratio must be invariant: **6 / 26 = 1524 / 6604 = 0.23076923**

Red Zone

The so-called “Red Zone” problem occurs when the *Number of Revolutions* (the ratio between *Total Measuring Range* and *Measuring Units per Span*) is not a power of 2.
When this problem arises, the device must operate within the “red zone” for a certain number of positions. The size of the “red zone” is variable; it is the remainder from the division between physical and programmed resolution.
The problem is represented graphically in the picture below.



When the encoder crosses the limit of the last value in the overall physical resolution, a counting error occurs, i.e. a jump in the position count.

In the example number 2, it is:

Overall physical resolution:

- Measuring Units per Span = 8192 steps (2 exp13)
- Total Measuring Range = 536870912 steps (2 exp29)
- Number of Revolutions = 536870912 / 8182 = 65536 (2 exp16)

Overall set resolution:

- Measuring Units per Span = 70 steps
- Total Measuring Range = 360 steps
- Number of Revolutions = 360 / 70

536870912 / 360 = 1491308

Red Zone size = remainder from the division

536870912 – (360 x 1491308) = 536870912 – 536870880 = 32.

MANUALS, SOFTWARE and DIMENSIONAL DRAWING DOWNLOAD AT:

https://www.elap.it/absolute-encoders/encoder-mem-bus-ethernet-ip/

ELAP VIA VITTORIO VENETO, 4 · I-20094 CORSICO (MI) · TEL. +39.02.4519561
FAX +39.02.45103406 · E-MAIL INFO@ELAP.IT · SITE WWW.ELAP.IT