

목록

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LMSN

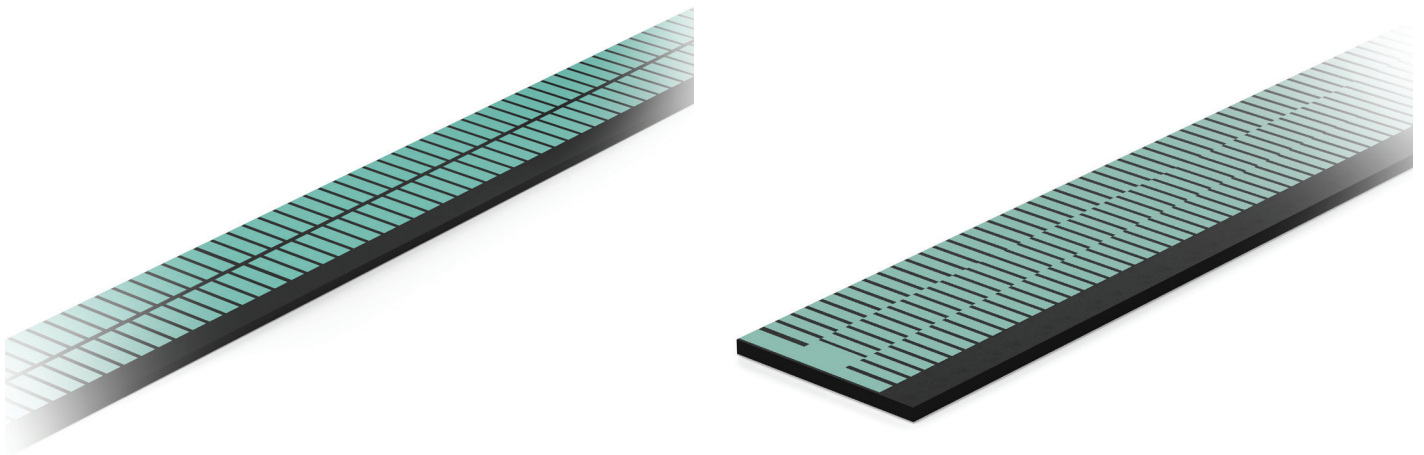
Linear Magnetic Scale Nonius

BOGEN produces magnetic scales for a large variety of different applications. Linear Magnetic Nonius Scales can be encoded two or three tracks. Using different accuracy classes scales can be tailored to your requirements. Perfect fit for IC-MU series encoder chip from IC-Haus.

Absolute
Measuring

Linear
Applications

Counting and
Controlling
Tasks



Features and Benefits

- different accuracies available on demand
- two or three track magnetization
- different scale geometries
- customizable for many applications
- no wear during operation
- non-contact measurement
- resistant to dust, cooling lubricant emulsion, oil, etc.

Characteristics

Linear Magnetic Scale

accuracy class	$\pm 3 \mu\text{m}$, $\pm 10 \mu\text{m}$, $\pm 20 \mu\text{m}$
material	magnetic tape: elastomer filled with ferrite; carrier tape: stainless steel
width [mm]	standard: 6, 8, 10 3-track: 12, 15
thickness [mm]	0.5 to 1.66 (depending on scale setup)
pole pitch [mm]	standard for IC-MU: 1.28; 1.5 ; 2.0
magnetic flux of amplitude	dependant on pole pitch
operating temperature	- 40 °C to + 100 °C max.
expansion coefficient	$\sim 17 \times 10^{-6}/\text{K}$
minimum bending radius [mm]	65
length in pieces	see „Scale Dimensions“ next page
mounting holes for pieces	multiple hole combinations and angle cuts possible (on request, see below)

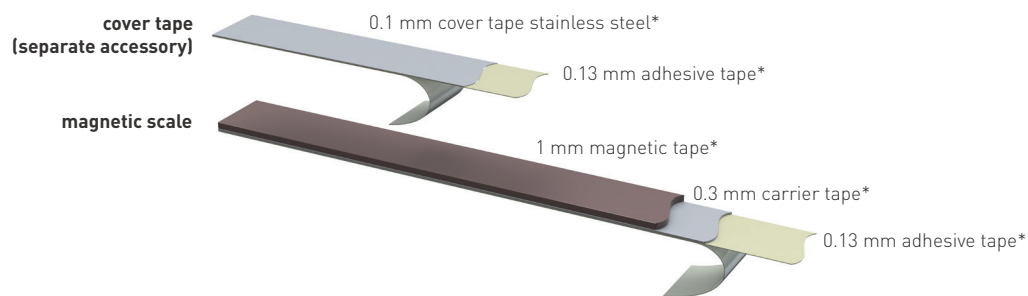
Adhesive Tape (optional)

material	double-sided acrylic adhesive tape
width [mm]	1 mm narrower than width of elastomer tape
thickness [mm]	standard: 0.13 (see more options in table “optional stackup” on page 3)

Cover Tape (separate accessory)

material	cover tape: non-magnetic stainless steel; adhesive tape: acrylic adhesive tape
thickness [mm]	standard: 0.23 total thickness (0.1 mm stainless steel tape + 0.13 mm adhesive tape) (see more options in table “optional stackup” on page 3)

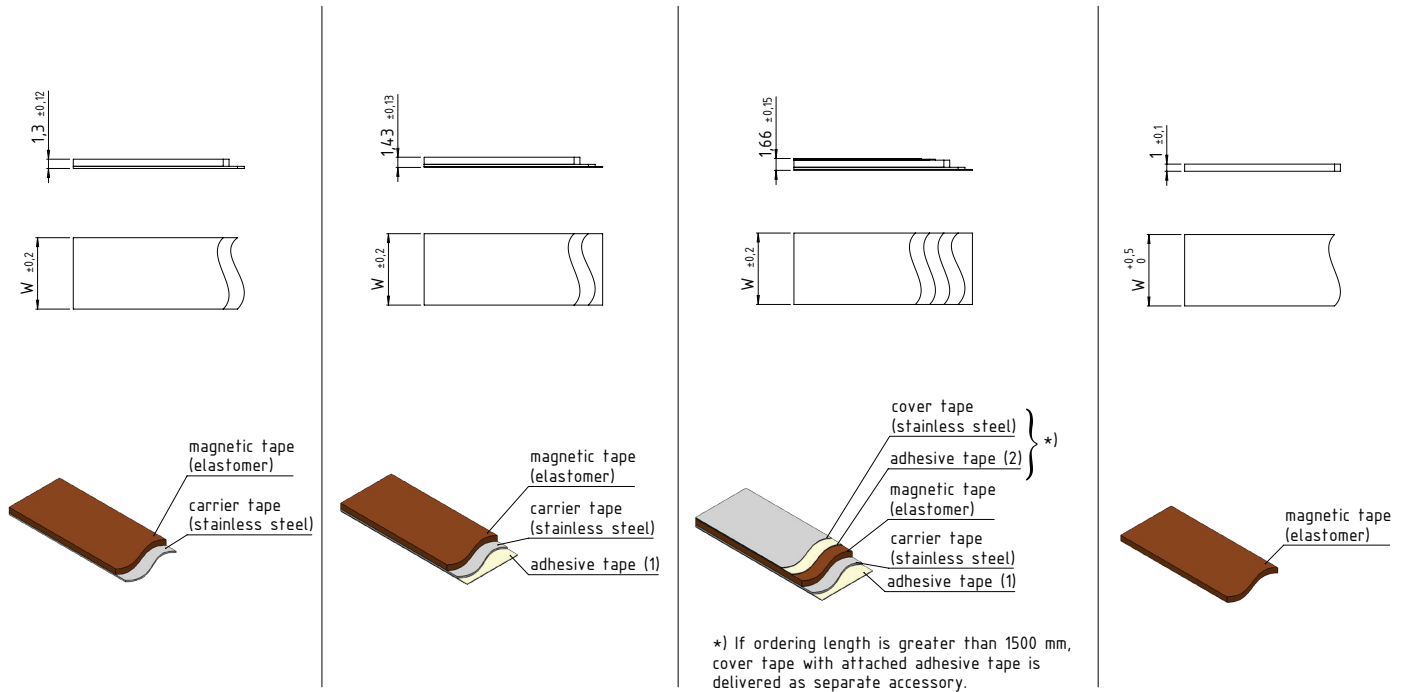
Standard Layer Stack-Up



* standard parameters (others, please see order code)

Due to mechanical characteristics of individual parts and the applied manufacturing processes, the top surface of the magnetic component may show minimal surface changes. This has no negative impact on functionality.

Scale Dimensions with Standard Layer Stack-Up



Scale Dimensions with Optional Layer Stackup ⁽¹⁾

For individual scale setups following layer dimensions can be used

magnetic tape	0.5 mm or 1.0 mm
carrier tape	0.1 mm or 0.3 mm
adhesive tape	0.13 mm , 0.212 mm or 0.050 mm
cover tape	0.076 mm, 0.1 mm , 0.15 mm

⁽¹⁾ standard parameters in bold

Length

Linear magnetic scales cut in pieces or supplied on reel.

Marking ⁽²⁾

The marking distance is 250 mm and builds up as follows:

	accuracy class	pole pitch master track # pole pairs	year/ calendar week	reel no. (or number of pieces)	master and nonius track position as indicated by arrows
2-track nonius tape	A20	N1.28 - 32	2244	01	M ↓ N ↑
3-track nonius tape	A20	N1.28	2244	01	S ↑ M → N ↓

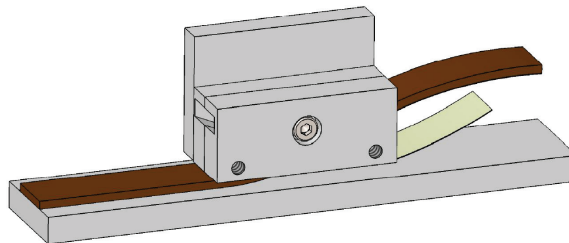
⁽²⁾ The magnetic strip counter indicates the number of remaining strips on the reel. The strip is marked only once per length.

Optional Accessories

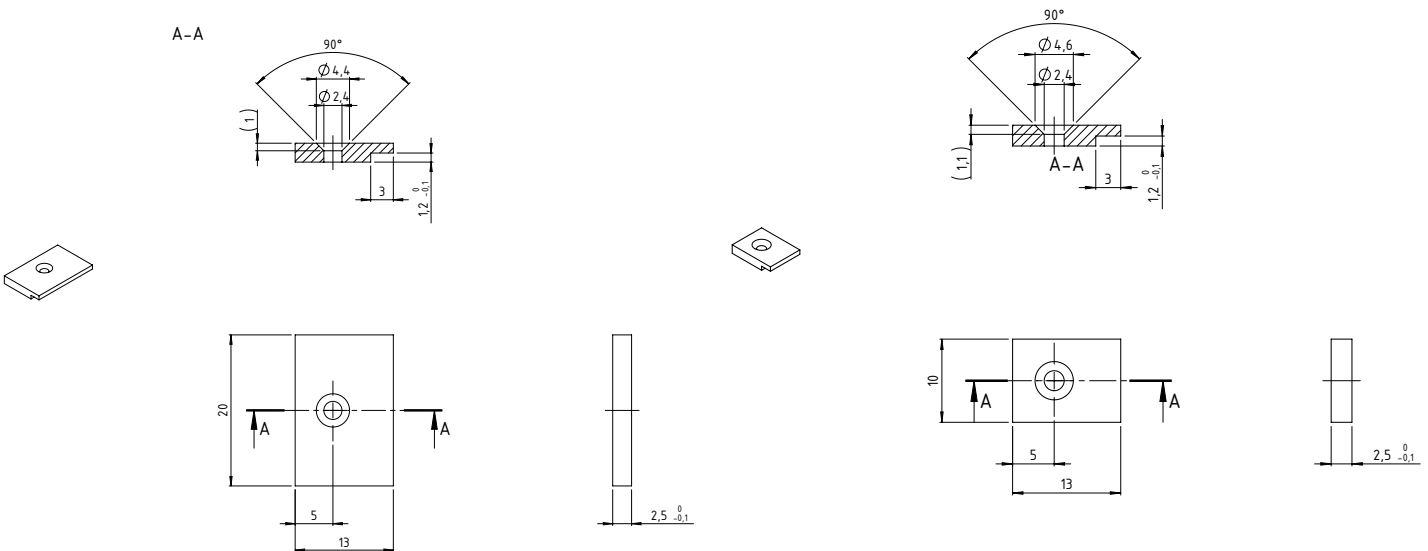
- Extruded Aluminum Profile (please contact our application engineers for the right profile for your LMS)



- Scale Applicator (for easy and precise installation of the scale)



- Clamps for Scale Ends

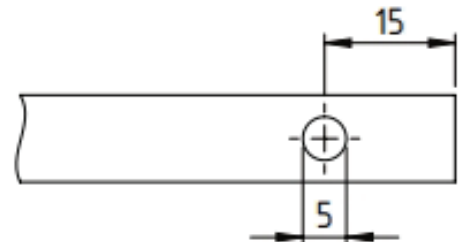
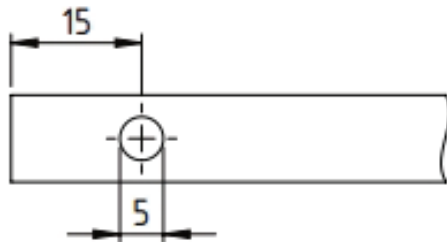


Standard Mounting Holes

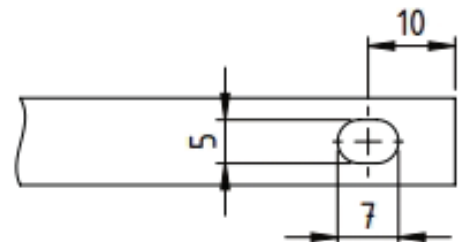
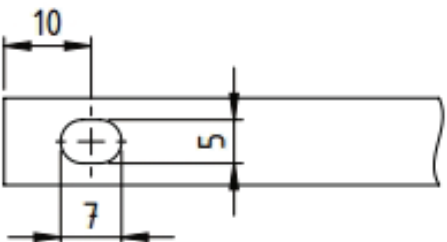
Option 1



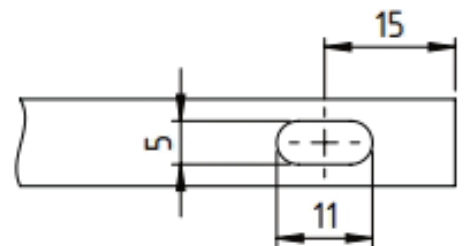
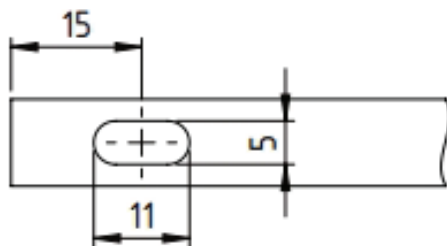
Option 2



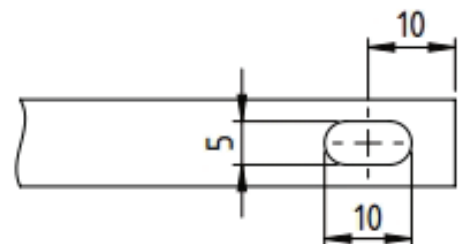
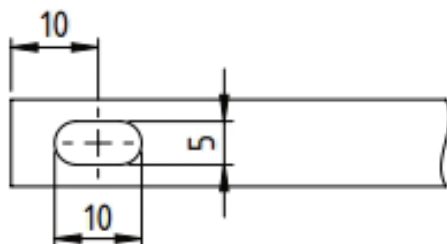
Option 3



Option 4



Option 5



Order Code

LMS N - P - L - W - H - A - C - K - T - EB

		code	explanation ⁽¹⁾
		2	two tracks
		...	number of tracks (up to nine)
P	track parameters	N1.28	pole length 1.28 MM (for IC-HaUs chip IC-MU)
		N...	master pole length of nonius code
L	length	L ...	piece, length in mm ⁽⁴⁾
W	width (mm)	W5	5 mm
		W6	6 mm
		W8	8 mm
		W8-10	8 mm Elastomer (only for P95-05 extrusion) 10 mm stainless steel carrier tape (only for P95-05 extrusion)
		W10	10 mm
		W12	12 mm
		W15	15 mm
		W20	20 mm
		W25	25 mm
H	scale height (mm)		1 mm magnetic tape, 0.3 mm carrier tape
		H1-0.1	1 mm magnetic tape, 0.1 mm carrier tape
		H0.5-0.3	0.5 mm magnetic tape, 0.3 mm carrier tape
		H0.5-0.1	0.5 mm magnetic tape, 0.1 mm carrier tape
A	accuracy class	A03	± 3 µm/m (only delivered up to piece length 2300 mm)
		A10	± 10 µm/m (only delivered up to piece length 2300 mm)
		A20	± 20 µm/m
C	cover tape		without cover tape
		C	equipped with cover tape (only delivered up to piece length of 2300 mm, otherwise delivered seperately)
K	adhesive tape		without adhesive tape
		K	equipped with adhesive tape
T	text imprint		with BOGEN text imprint
		T0	without text imprint
		T2	with customer specific text imprint (on request)
EB	mounting holes ⁽⁵⁾		without mounting holes
		1	please see drawings on the previous page
		2	
		3	
		4	
		5	

⁽¹⁾ standard parameters are bold

⁽⁴⁾ length of nonius scale: measuring length with specified accuracy class + additional 5 poles at both ends recommended

⁽⁵⁾ for other options than listed please contact our application engineers

Ordering Example

LMS2-N1.28-16-L16-W6-A03-K-T2

number of tracks: 2
 track1: Nonius
 ~1.37 mm pole pitch, 15 pole pairs
 S-start pole, 3 mm track width
 track2: Master
 1.28 mm pole pitch, 16 pole pairs
 N-start pole, 3 mm track width
 accuracy class: $\pm 03 \mu\text{m/m}$
 total width: 6 mm
 total height: 1.43 mm
 total length: 16 mm
 (shortened Nonius)
 usable measuring length: 3 mm
 without cover tape
 with adhesive tape
 with customized imprint: M -> (arrow is pointing towards master track)

LMS3-N1.5-1024-L1700-W12-A03-K

number of tracks: 3
 track1: Segment
 ~1.55 mm pole pitch, 992 pole pairs
 S-start pole, 3.5 mm track width
 track2: Master
 1.5 mm pole pitch, 1024 pole pairs
 N-start pole, 5 mm track width
 track3: Nonius
 ~1.5 mm pole pitch, 1023 pole pairs
 S-start pole, 3.5 mm track width
 accuracy class: $\pm 03 \mu\text{m/m}$
 total width: 12 mm
 total height: 1.43 mm
 total length: 1700 mm
 (shortened Nonius)
 usable measuring length: 1685 mm
 without cover tape
 with adhesive tape
 with BOGEN standard imprint

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Handling of Magnetic Scales

Magnetic scales have been magnetized with a magnetic pattern that can be changed by various influences. Therefore, some precautions must be taken to maintain the quality of the magnetic pattern permanently.

- Remove all strong magnets near the magnetic scales - the stronger the magnet, the higher the risk of damage.
- Keep strong magnets, even for short moments, away from the magnetic scales - the farther away the lower the effect on the scale.
- Make sure that no contact can occur during assembly between the magnetic scales and strong permanent magnets or electromagnets.
- Avoid all materials between the scale and, for example, a magnetic brake, being magnetic.
- When storing, supplying and picking parts, make sure that the magnetic scales are not transported with other magnets in a stacked or contiguous manner. These include e.g. magnets for linear drives and possibly permanent magnets for electric motors.
- Store the scales without additional load from other parts or material and avoid mechanical damage to the elastomer surfaces.
- Remove all tools with magnetic properties from the assembly area, e.g. screwdriver with black tips (typical sign for magnets),
- Do not use magnet holders or handling magnets for the magnetic scales.
- Do not use lamps with a magnetic base near the magnetic scales.
- Avoid possible inductance caused by high voltage power lines near magnetic scales.
- Do not store magnetic scales touching with the scale sides, as this may cause magnetic interference. At high accuracies, a distance of at least one pole length between the scales must be observed.
- Linear scales with steel band may not be bent. The material is optimized for linear use.