NUMERIK JENA

LIK 21 LIK 22 LIK 23

Exposed Linear Encoders

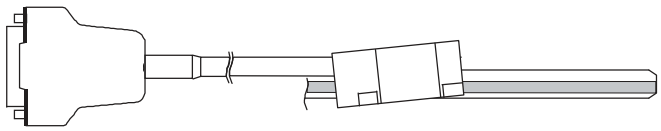
compact model range

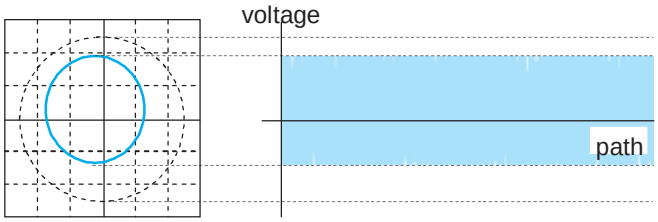
Exposed Linear Encoders- compact model range LIK 21 LIK 22 LIK 23

- Extremly small dimensions of scanning head for crowded installation conditions
- High insensitivity to contamination of scale tapes due to two optical sensors in the scanning head
- High resolution and accuracy
- High interpolation accuracy due to electronic offset and amplitude control
- Signal processing in the D-Sub-connector
- Integrated signal interpolation up to 100x in the connector
- Optional with installation LED
- Wide mounting tolerances
- Defined thermal behavior of the DOUBLEFLEX scale tape
- Mechanical decoupled DOUBLEFLEX scale tape
- Simple mounting of the scale tapes because of double-side adhesive tapes

Dynamic offset and amplitude control

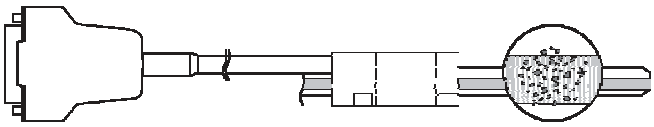
Incorrect mounting

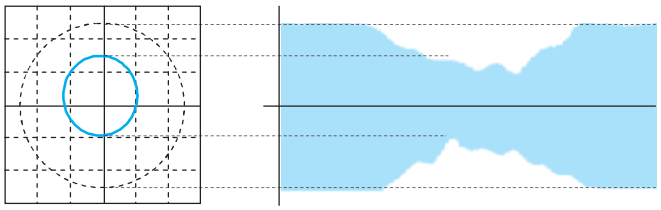




Lissajous-figure:
U_{sin} ; U_{cos}

Contaminated scale tape



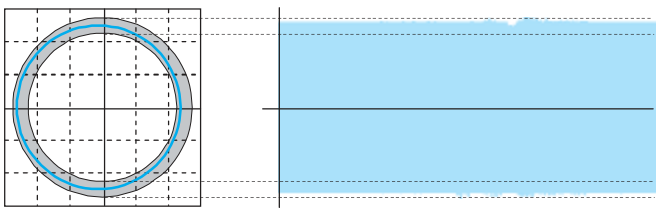


Contamination and mounting errors lead to interferences in the optical scanning of the scale by the scanning head and so to periodic deformations of the sinusoidal counting track signals.

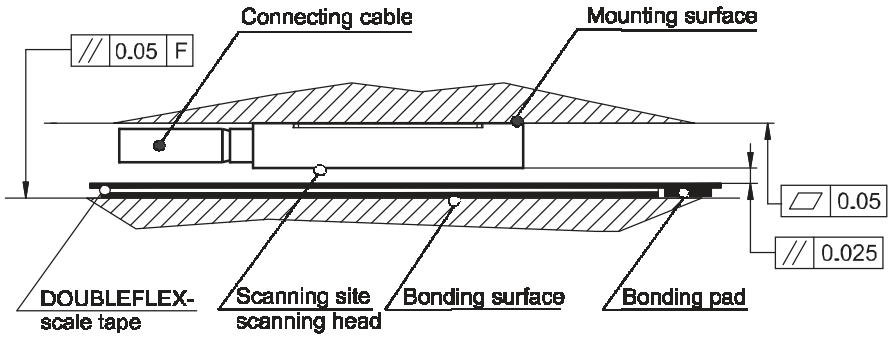
These deformations manifest themselves as

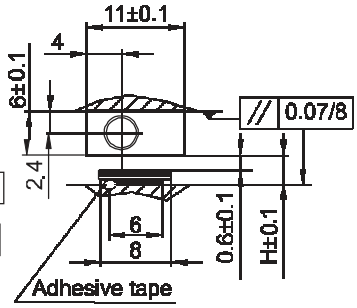
- offset deviations and
- amplitude deviations, as well as
- amplitude differences between the sine and cosine channel and lead to interpolation errors.

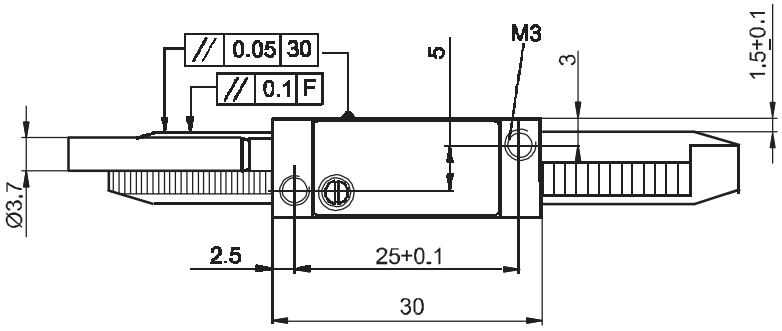
Scanning signal after offset and amplitude correction



The signals generated by the measuring module are automatically corrected within the sensor without following error over the entire velocity range. This measure not only increases the accuracy, but also the reliability of the encoder.







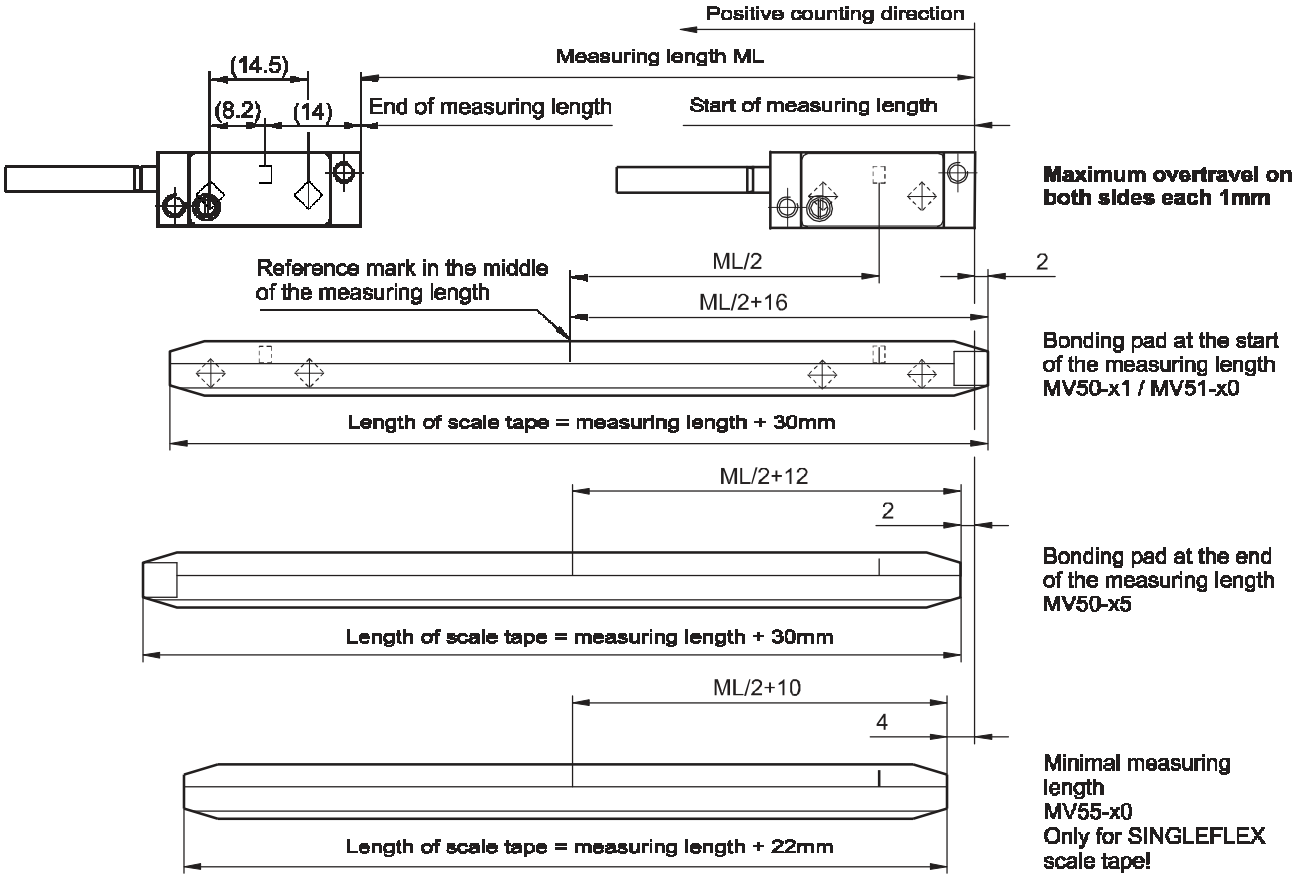
Specification of scale tape	H ± 0.1
SINGLEFLEX	1.1
DOUBLEFLEX	1.3

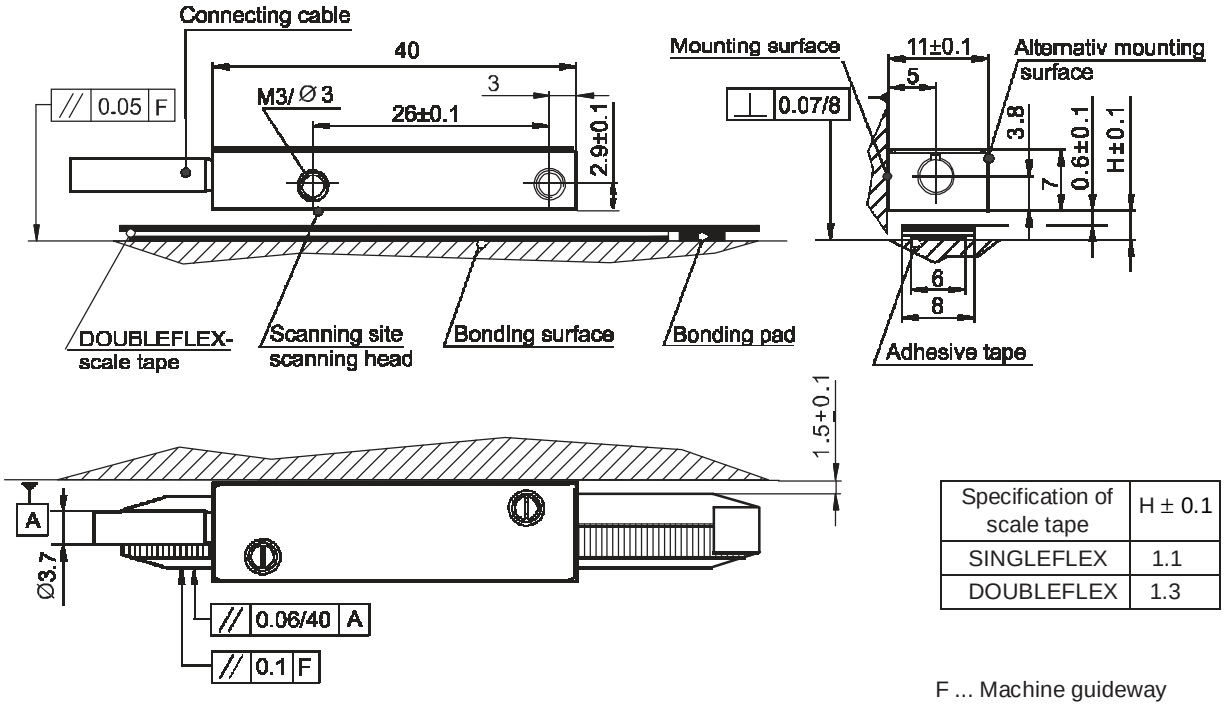
The mounting surface must be vertically adjustable to ensure the distance paramater and the parallelism.

F ... Machine guideway

Allocation of scanning head, scale tape and measuring length

LIK 21



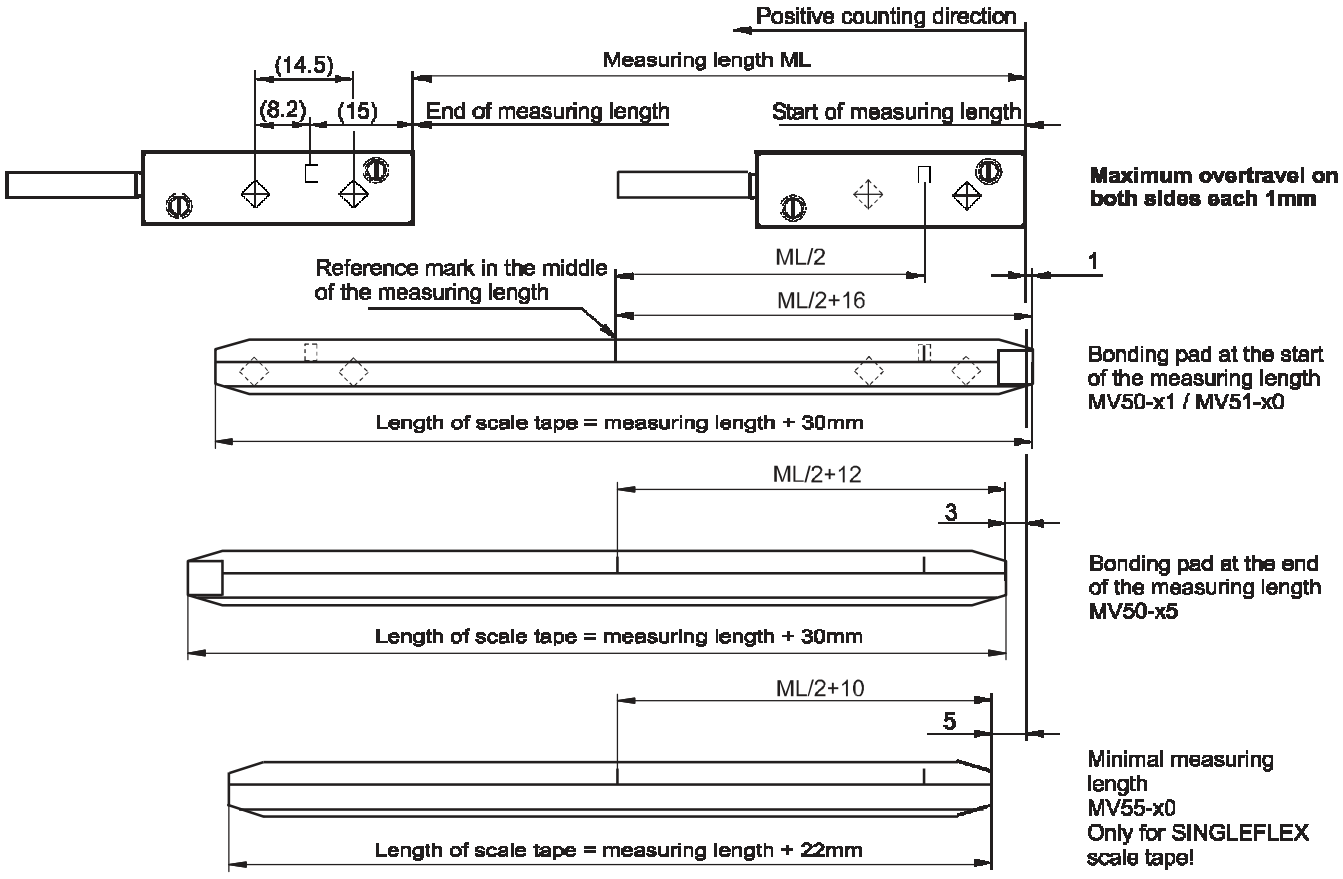


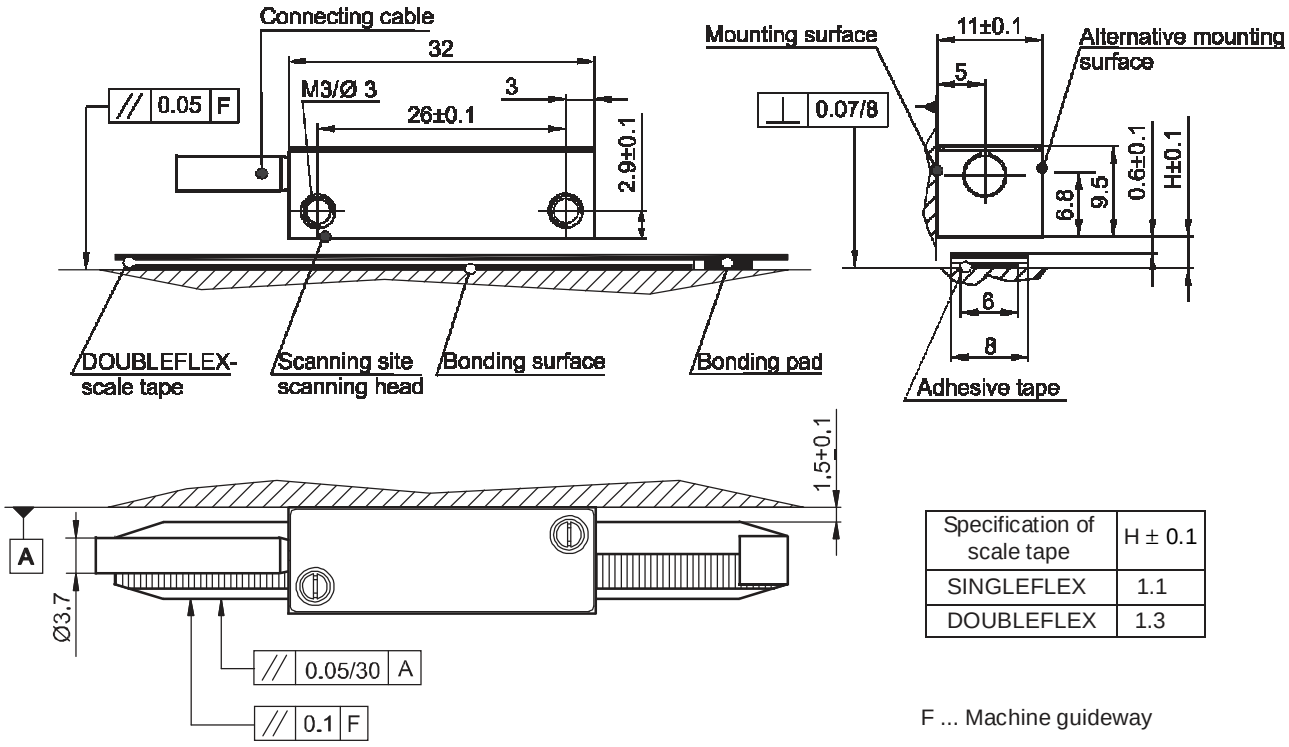
Specification of scale tape	H ± 0.1
SINGLEFLEX	1.1
DOUBLEFLEX	1.3

F ... Machine guideway

Allocation of scanning head, scale tape and measuring length

LIK 22



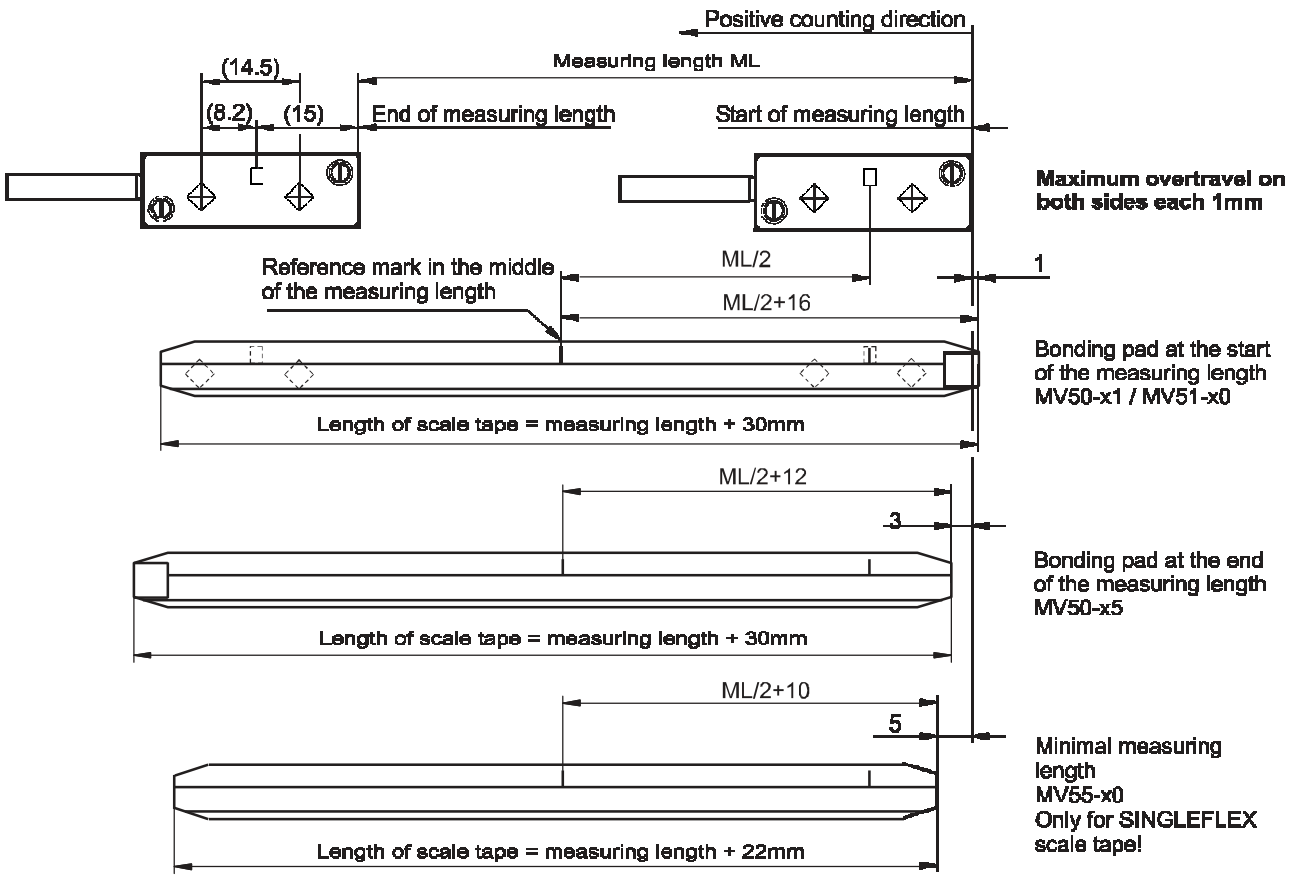


Specification of scale tape	H ± 0.1
SINGLEFLEX	1.1
DOUBLEFLEX	1.3

F ... Machine guideway

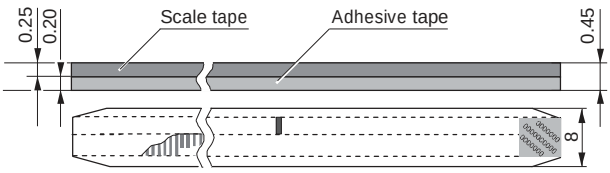
Allocation of scanning head, scale tape and measuring length

LIK 23



SINGLEFLEX scale tape

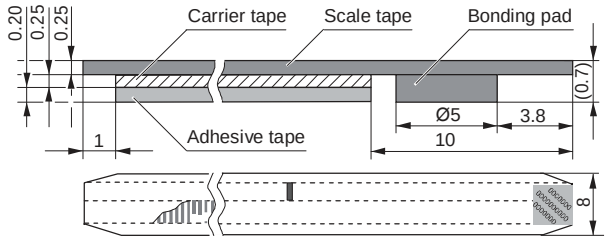
always without bonding pad



Preferentially used for:

- Scale tape carrier with thermal expansion behavior same as steel ($\alpha \approx 10{,}5 \times 10^{-6}$ grd $^{-1}$)
- Low accuracy requirements

DOUBLEFLEX scale tape



Mechanical isolation of the scale tape from the scale tape carrier; this results in defined thermal behavior.

Preferentially used for:

- Carrier materials with thermal expansion behavior different from steel
- Measuring lengths from 100 mm
- High accuracy requirements

Technical data

		LIK 21	LIK 22	LIK 23
Mechanical data	**Scanning head dimensions [mm]**	30 x 11 x 6	40 x 11 x 7	32 x 11 x 9,5
	Weight of scanning head (without cable)	3.2 g	5.5 g	5.0 g
	Recommended resolution	0.05 µm; 0.1 µm; 0.2 µm; 0,5 µm; 1.0 µm; 5.0 µm		
	Travel speed			
	- without interpolation (maximum)	600 m/min resp. 10 m/s		
	- with 50x interpolation (maximum)	96 m/min resp. 1.6 m/s		
	Measuring length	up to 30 m		
	Scale tape			
	- Material	steel		
	- Grating period (GP)	20 µm standard		
	- Reference marks	- periodically every 50 mm, starting from the middle of the measuring length - distance coded at 1000 x GP - at the center of the measuring lenght - others on request		
	Linear expansion coefficient			
	- DOUBLEFLEX- scale tape	10.5 x 10 $^{-6}$ deg $^{-1}$		
	- SINGELFLEX- scale tape	as function of material of the mounting surface		
	Accuracy classes			
	- DOUBLEFLEX- scale tape	±1 µm; ±2 µm; ±3 µm; ±5 µm		
	- SINGELFLEX- scale tape	±5 µm; other on request		
Electrical data	**Scanning frequency**	max. 500 kHz		
	Output interfaces and connectors			
	Voltage output	1V_{pp}/ 15 pin D-Sub-connector		
	Square wave output (RS 422)	RS 422 with interpolation up to 50x / 15pin D-Sub-connecto r		
	Supply voltage	5V DC ±10%		
	Power consumption			
	Voltage output	80 mA [1]; 100mA [2]		
	Square wave output	200 mA [1]; 220 mA [2] [1]...without installation-LED; [2]...with installation-LED		
	Cable lengths			
	Cable permanently connected to the scanning head	up to 3 m (standard lengths: 0.3 m; 0.5 m; 1 m; 1,5 m; 2 m; 3 m)		
	Permissible total cable length (with extension cable)	max. 100 m with extension cable		
	Cables`permissible bending radius	bent once: 8 mm ; moving constantly: 40 mm		
Ambient conditions	**Operating temperature range**	0°C ... 55°C		
	Storage temperature range	-20°C ... +70°C		
	Vibration (50Hz ... 2000Hz)	≤ 200ms $^{-2}$		
	Shock (11ms)	≤ 400ms $^{-2}$		
	Humidity	93% (no condensing)		

Ordering key for scanning head

LIK 2 1 - L 4 1 - T Z ***Designation example***

Sensor

2	Two field sensor

Dimension (mm)

1	30 x 11 x 6 mm³
2	40 x 11 x 7 mm³
3	32 x 11 x 9.5 mm³

Grating period

-	20 µm

Output signals

C	sinusoidal signal 1 V_{pp}
L	square wave signal RS 422 with 5x interpolator
M	square wave signal RS 422 with 10x interpolator
I	square wave signal RS 422 with 25x interpolator
N	square wave signal RS 422 with 50x interpolator
P	square wave signal RS 422 with 100x interpolator

Frequency/ Edge separation

X	distinguishing mark for clock frequency of counter on request (only valid for versions with interpolation)

Connectors on cable

Z*	15pin D Sub;electronics in the connector

Cable fixed to the scanning head (∅ 3.7 mm)

R	0.3 m
S	0.5 m
T	1 m
P	1,5 m
V	2 m
W	3 m
U [1]	other length on request (length max. 3 m)

Version

-	standard
3 [1]	non- magnetic scanning head
K	set-up- LED in the connector
N [1]	non- magnetic scanning head; set- up- LED in the connector

Installation conditions

2	thread M3 in the scanning head
1 [2]	bore ∅ 3 in the scanning head

1 ... supplied with surcharge 2 ... only for LIK 22 and LIK 23

*** 15pin D Sub connector-** Pin assignment

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Housing
1V $_{SS}$	-	-	-	U_{0-}	U_{2-}	U_{1-}	-	5V	0V	-	-	U_{0+}	U_{2+}	U_{1+}	-	Shield
RS 422	-	-	NAS	R-	B-	A-	-	5V	0V	-	AS	R+	B+	A+	-	Shield
Colour	-	-	vt	pk	rd	bn	-	bu	wh	-	-	gy	bk	gn	-	

Ordering key for scale tapes

MV 5 0 – 1 1 B P 00770 ***Designation example***

Material

5	steel tape/ double array sensor

Design type

0	DOUBLEFLEX, standard [3]
1	SINGLEFLEX, standard minimal measuring length
5	**with** reference mark [1,4]

Accuracy class

1	± 1 µm
2	± 2 µm
3	± 3 µm
4	± 5 µm

Position of bonding pad/ construction

0	none [1]
1 [2]	bonding pad at the start of measuring length
3	without adhesive tape
5**	bonding pad at the end of measuring length [2]

measuring length (ML) [mm]

Grating period

P	20 µm

Position of reference mark (RM)

O	none
B	RM in the center of the measuring length
F	RM distance coded at 1000 * GP [5]
N	RM at 50 mm spacings, starting at the center of measuring length

E** customized version [6]

1 ... only for SINGLEFLEX scale tape
2 ... only for DOUBLEFLEX scale tape
3 ... minimal measuring length of DOUBLEFLEX scale tape= 100 mm
maximal measuring length of DOUBLEFLEX scale tape= 7300 mm
4 ... measuring length + 22 mm
5 ... maximal measuring length= 8000mm
6 ... specified in XXX mm from start of measuring length
**... no standard, supplied with surcharge