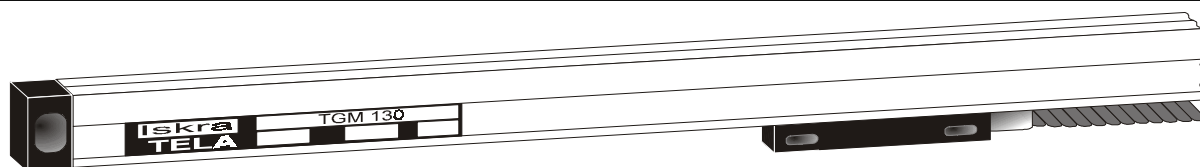


INCREMENTAL LINEAR SCALES

TGM 130

Optoelectronic



GENERAL DESCRIPTION:

The TGM 130 is an optoelectronic incremental sealed linear scale, applied in numerous industrial areas for high-precision measuring of positions (machine tool industry, positioning systems, robotics, etc.).

Measuring lengths: 70 to 1240 mm

Cross section: 18 x 32 mm (46 mm)

Accuracy: $\pm 10, \pm 5, \pm 3 \mu\text{m}$

Resolution: 0.5, 1, 2, 5, 10 μm

Output signals: DO (square wave)

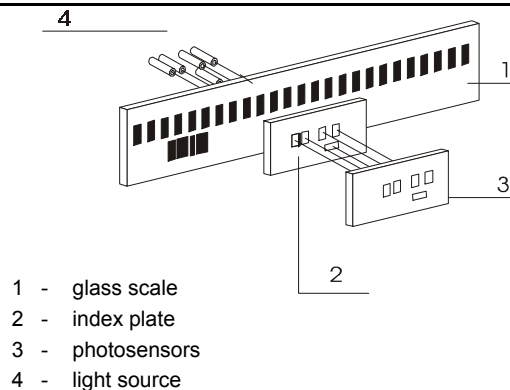
DI (square wave inverted signals)

DS (square inverted signals RS422A)

SI (sine-wave current signals)

SV (sine-wave voltage signals 1Vpp)

OPERATING PRINCIPLE:



MECHANICAL DATA:

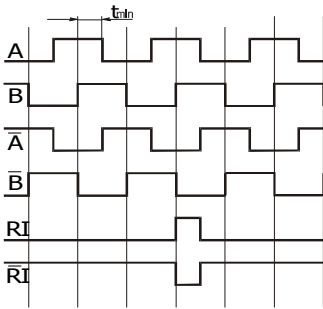
Standard measuring length "Lm" (mm)	70/120/170/220/270/320/370/420/470/520/570/620/670/720/770/820/920/1020/1140/1240
Reference mark	Standard position: for $L_m \leq 1020$ mm: 35 mm from the beginning to the end of measuring length for $L_m \geq 1140$ mm: 45 mm from the beginning to the end of measuring length Other position optional at spacing of 50 mm along the measuring length.
Accuracy class	$\pm 10 \mu\text{m}, \pm 5 \mu\text{m}, \pm 3 \mu\text{m}$
Interval	20 μm or 40 μm
Resolution	0.5, 1, 2, 5, 10 μm for DI or DS output signals; 5 or 10 μm square wave output signals DO (12 V)
Maximal speed	45 m/min continuously, 60m/min temporarily
Permissible acceleration	30 m/s^2
Moving force for scanning unit	$\leq 5\text{N}$
Degree of mechanical protection	IP 53 (in compliance with mounting instructions); IP 64 with compressed air purge
Vibrations (50...2000 Hz)	30 m/s^2 , option 300 m/s^2
Shocks (11ms)	100 m/s^2
Temperature	operating: 0 °C to 50 °C storage: -20 °C to 70 °C
Permissible relative humidity	20% - 70%
Cable length	standard 3m, extension on order to 20m (SI signals), extension on order to 50m (DI and DS signals), extension on order to 150m (SV signals)
Mass	0.45 kg + 0.65 kg/m

ELECTRICAL DATA:

Output signals	Voltage U_n	Current I_n
DS - square-wave inverted RS422A	5 V $\pm 5\%$	≤ 130 mA
DI - square-wave inverted	5 V $\pm 5\%$	≤ 120 mA
SI - sine-wave current	5 V $\pm 5\%$	≤ 70 mA
DO - square-wave	12 V $\pm 5\%$	≤ 120 mA
SV - sine wave voltage	5 V $\pm 5\%$	≤ 150 mA

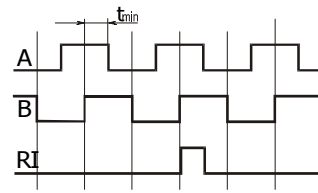
ELECTRICAL DATA:

Square-wave signals with inverted signals and RS 422A - DI, DS:

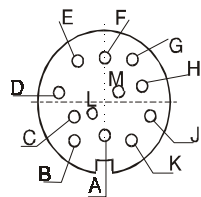


DS (RS- 422 A)	
$I_{sink} = 20 \text{ mA}$	$U_{OL} \leq 0.5 \text{ V}$
$I_{source} = -20 \text{ mA}$	$U_{OH} \geq 2.5 \text{ V}$
$t_{LH} = t_{HL} \leq 30 \text{ ns}$; without load	
DI	
$I_{sink} = 15 \text{ mA}$	$U_{OL} \leq 0.5 \text{ V}$
$I_{source} = -15 \text{ mA}$	$U_{OH} \geq 4.0 \text{ V}$
$t_{LH} = t_{HL} \leq 60 \text{ ns}$; without load	

Square-wave output signals - DO:

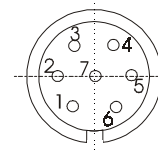


Signal level ...	HTL	Transition time:
$I_{sink} = 1 \text{ mA}$	$U_{OL} \leq 0.5 \text{ V}$	$t_{LH} = t_{HL} \leq 60 \text{ ns}$, without load
$I_{source} = 4 \text{ mA}$	$U_{OH} \geq 11 \text{ V}$	$t_{min} = f(v)$



12 pole connector (Amphenol) square-wave output signals (DI, DS)

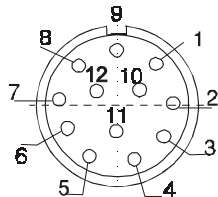
contact	A	B	C	D	E	G	H	K	L
signal	shield	0 V	A	\bar{A}	B	RI	\bar{RI}	+V	\bar{B}



7 pole connector (Amphenol) square-wave output signals (DO)

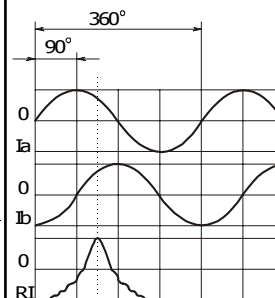
contact	1	2	3	4	5	6	7
signal	0 V		A	B	+V	RI	shield

Sinusoidal output signals - SI:



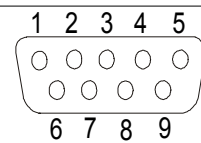
12 pole connector (Contact) square-wave output signals (DI, DS)

contact	1	2	3	4	5	6	7	8	9	10	11	12
signal	\bar{B}	+5V	RI	\bar{RI}	A	\bar{A}	B	shield	0V	0V	+5V	



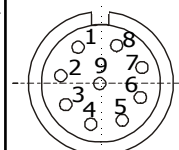
Amplitude of signals

$I_b = I_a = 7 - 16 \mu\text{A}_{pp}$ at load 1 kW
$I_{ri} = 2 - 8 \mu\text{A}_{pp}$ used component



9 pole connector (D-Sub) square-wave output signals (DI,DS)

contact	1	2	3	4	5	6	7	8	9
signal	shield	\bar{RI}	\bar{B}	\bar{A}	+5V	RI	B	A	0V



9 pole connector (Contact) sine-wave output signals (SI)

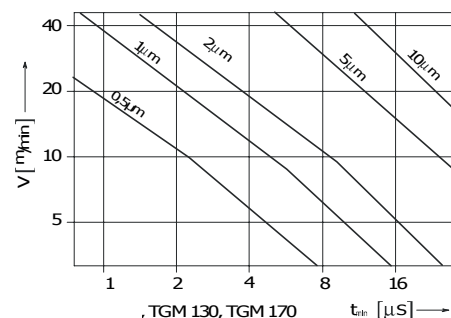
contact	1	2	3	4	5	6	7	8	9
signal	I_{a+}	I_{a-}	+5 V	0 V	I_{b+}	I_{b-}	I_{ri+}	I_{ri-}	shield

Sine wave voltage signals 1 V pp SV (remark: for details see Electrical DATA on page 28)

SPEED AND SCANNING UNIT

The maximum measuring speed allowed by the mechanical construction is given in the mechanical data table.

The dependence of minimum time interval between two neighbouring fronts of square-wave output signals is given at right.



ORDERING DATA:

Standard requirements							Special requirements			
TGM130	- XX -	X -	XX -	X -	X -	XXXX-	XX-	X-	X-	X-

Air inlet connection
[special requirement]:
0 ... without
1 ... with

Metal flexible tube:
0 ... without
1 ... with

Connector is defined with electrical versions DO, DI, DS or SI:
1 ... Amphenol 12 pole
2 ... Amphenol 7 pole
3 ... Contact 9 pole (male screw)
4 ... Contact 12 pole (female screw)
5 ... Contact 9 pole (female screw)
6 ... Contact 12 pole (male screw)
7 ... D-Sub 9 pole
9 ... other (specify)
0 without connector

Cable length in [m]:
Standard 3 m : 03
Example: 1.5 m : 1.5
25 m : 25

Measuring length:
Standard length

Accuracy:
3 ... $\pm 3\mu\text{m}$
5 ... $\pm 5\mu\text{m}$
0 ... $\pm 10\mu\text{m}$

Reference mark:
0 ... without
1 ... in the middle
2 ... on agreement
3 ... 2x35mm (see mechanical data)
2x45mm (see mechanical data)

Output signals:
DI, DS, SI, DO, SV

Resolution (DI, DO, DS): **Periode (SI):**
0.5 ... 0.5 μm 20 ... 20 μm
1 ... 1 μm 40 ... 40 μm
2 ... 2 μm
5 ... 5 μm
0 ... 10 μm

Voltage supply:
05 ... 5 V
12 ... 12 V

Remark
Standard delivery includes:
3 m
cable with metal flexible tube
12 pole
Amphenol connector (for DI, DS)
9 pole
Contact connector (for SI) or
7 pole
Amphenol connector (for DO)

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