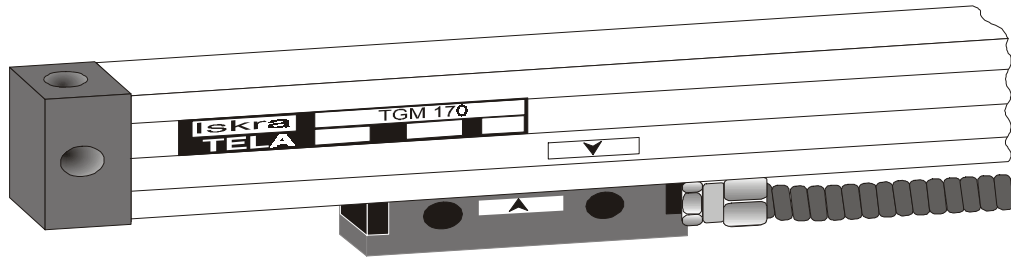


INCREMENTAL LINEAR SCALES

TGM170

Optoelectronic



GENERAL DESCRIPTION:

The TGM 170 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: 170 to 3040 mm

Cross section: 37 x 51.5 mm (77,5 mm)

Accuracy: ± 10, ± 5, ± 3µm

Resolution: 0.5, 1, 2, 5, 10 µm (for DI; DS)

Output signals: DI (square wave inverted signals)

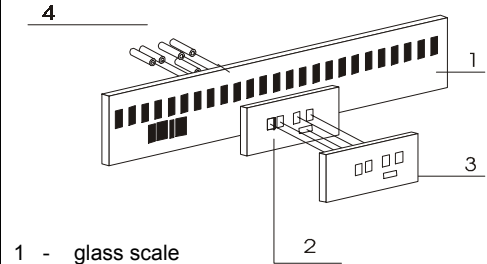
DS (square inverted signals

RS 422 standard)

SI (sine-wave current signals)

SV (sine - wave voltage 1V pp signals)

OPERATING PRINCIPLE:



- 1 - glass scale
- 2 - index plate
- 3 - photosensors
- 4 - light source

MECHANICAL DATA:

Standard measuring length "Lm" (mm)	170/220/270/320/370/420/470/520/620/720/770/820/920/1020/1140/1240/1340/1440/1540/1640/1740/1840/2040/2240/2440/2640/2840/3040
Reference mark	Standard position in center. Other positions optional at spacing of 50 mm along the measuring length.
Accuracy class	±10 µm, ± 5 µm, ± 3 µm
Interval	20 µm, 40 µm
Resolution	0,5, 1, 2, 5, 10 µm (for DI and DS signals)
Maximal speed	45 m/min continuously, 60 m/min temporarily
Permissible acceleration	30 m/s ²
Moving force for scanning unit	≤ 6N
Degree of mechanical protection	IP 53, IP 64 (in compliance with mounting instructions)
Vibrations (50...2000 Hz)	30 m/s ²
Shocks (11ms)	100 m/s ²
Temperature	operating: 0şC to 50şC storage: -20şC to 70şC
Permissible relative humidity	20% - 70%
Cable length	standard 3 m, extension on order to 20 m (SI output signals), extension on order to 50 m (DI, DS output signals), 150 m SV
Mass	0.4 kg + 2.2 kg/m measuring length

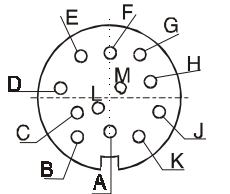
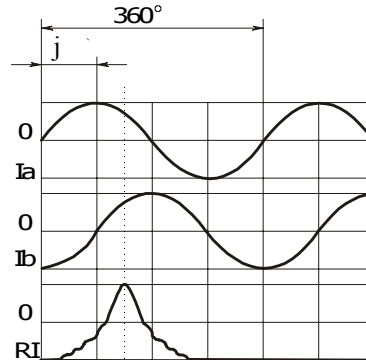
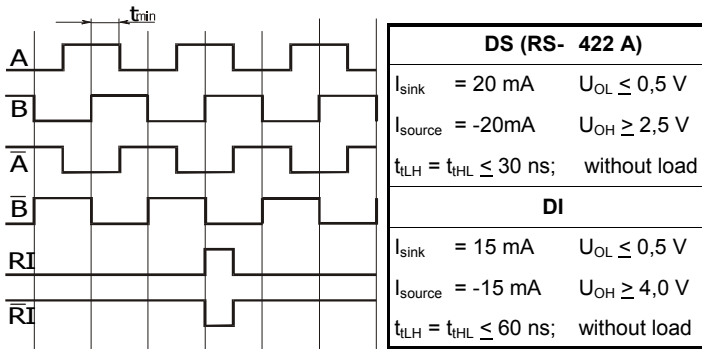
ELECTRICAL DATA:

Output signals	Voltage U _n	Current I _n
DS - square wave inverted RS422A standard	5 V ± 5%	≤ 130 mA
DI - square - wave inverted	5 V ± 5%	≤ 130 mA
SI - sine - wave current	5 V ± 5%	≤ 70 mA
SV - sine wave voltage 1Vpp	5 V ± 5%	≤ 150 mA

ELECTRICAL DATA:

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

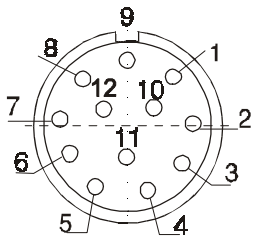
Sinusoidal output signals (SI):



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}

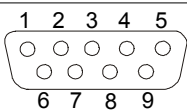
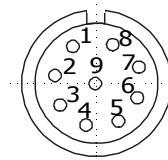
Amplitude of signals	
$I_b = I_a =$	$7 - 16 \mu A_{pp}$ at load 1 kW
$I_{ri} =$	$2 - 8 \mu A_{pp}$ used component
Phase - shift of signals I_a and I_b :	
$j =$	$90s \pm 15s$ $f < 15 kHz$
$j =$	$90s \pm 30s$ $f = 60 kHz$



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

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



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

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

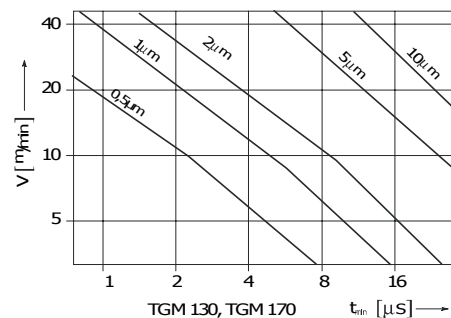
contact	1	2	3	4	5	6	7	8	9
signal	I_{a+}	I_{a-}	+5 V	0 V	I_{b+}	I_{b-}	I_{ri+}	I_{ri-}	shield

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 neighboring fronts of square-wave output signals is given at right.



ORDERING DATA:

Standard requirements						Special requirements					
TGM170	-XX-	X-	XX-	X-	X-	XXXX-	XX-	X-	X-	X-	X
											mounting elements
											Air inlet connection [special requirement]: 0 ... without 1 ... with
											Metal flexible tube: 0 ... without 1 ... with
											Connector is defined with electrical versions DS, DI or SI: 1 ... Amphenol 12 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 8 ... Hirose 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 ... ±3 µm 5 ... ±5 µm 0 ... ±10 µm
											Reference mark: 0 ... without 1 ... in the middle 2 ... on agreement
											Output signals: DI, DS, SI, SV
											Resolution (DI, DS): 0.5 ... 0.5 µm 1 ... 1 µm 2 ... 2 µm 5 ... 5 µm 0 ... 10 µm
											Periode (SI): 20 ... 20 µm 40 ... 40 µm
											Voltage supply: 05 ... 5V

Remark

Standard delivery includes:
scale cover with m1 and m2 =0
(see drawing: dimensions)

3 m
 cable length
12 pole
 Amphenol connector
 (for DI, DS)
 Contact connector (for SV)
 or
9 pole
 Contact connector
 female screw
 (for SI)

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