

# INCREMENTAL ANGLE ENCODERS

**TGR62**

**Optoelectronic**

**62.6**

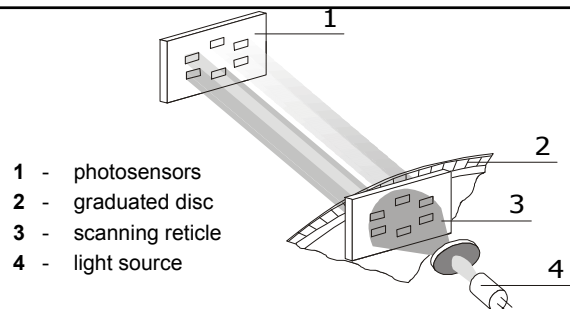


## GENERAL DESCRIPTION:

The incremental angle encoders TGR 62 transform mechanical rotation to a series of electrical pulses. Operating principle is shown in the drawing below. Periodic signals of approximate sine-wave shape are generated on the photosensors via photoelectric scanning. Reference signal is generated on the similar way and can be unique or distance coded.

**Number of lines:** 5000, 6000, 9000, 18000  
**Reference mark:** 1 or DCR (Distance coded) only for 18000 lines  
**Diameter:** 90 mm  
**Accuracy:**  $\pm 7,5''$   
**Output signals:** DS (square wave signals, RS422)  
 SV (sine wave 1Vpp output signals)  
 SI (sine wave 11  $\mu$ A signals)

## OPERATING PRINCIPLE:



## APPLICATION AREA:

Incremental rotary encoders are applied in numerous industrial areas for high-precision measuring of angles, positions and rotation speed. Most frequent application areas: machine tool industry, positioning devices, robotics, telescopes, antennas etc.

## MECHANICAL DATA:

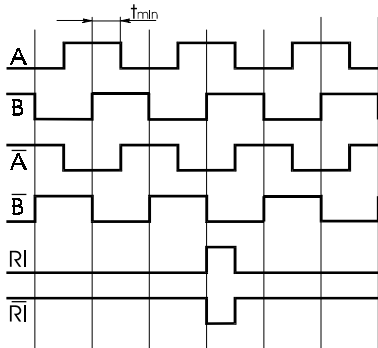
<b>Number of lines:</b>	5000	6000	9000	18000
<b>Number of perodes SI, SV:</b>	5000	6000	9000	18000
<b>Number of perodes DS:</b> (with integrated interpolation electronics)	5000, 10000, 25000 50000, 125000 250000	6000, 12000, 30000, 60000, 150000, 300000	9000, 18000, 45000, 90000, 225000, 450000	36000, 180000, 900000
<b>DCR</b>	<b>Number of reference marks:</b>			36
	<b>Nominal increment (lines):</b>			1000
	<b>Maximal rotation angle to determine position:</b>			20°
<b>Maximum shaft displacement</b>	0,02 mm axial; $\pm 0,05$ mm radial			
<b>Rotor inertia moment</b>	$\leq 6 \times 10^{-5}$ kgm <sup>2</sup>			
<b>Starting moment at 20°C</b>	$\leq 0.05$ Nm			
<b>Life time of bearings</b>	$4 \times 10^9$ revolutions			
<b>Admissible rotation speed</b>	4000 min <sup>-1</sup>			
<b>Weight</b>	1.2 kg			
<b>Operating temperature</b>	0°C to 70°C			
<b>Relative humidity</b>	max 95% (IP 64) (no condensation)			
<b>Protection class (IEC 60529)</b>	IP 64			
<b>Shocks</b>	300 m/s <sup>2</sup>			
<b>Admissible vibrations (50 - 2000 Hz)</b>	100 m/s <sup>2</sup>			

## ELECTRICAL DATA:

Output signals	Voltage U <sub>n</sub>	Current I <sub>n</sub>	Max. cable length
<b>DS - square wave inverted RS422A standard</b>	5 V $\pm$ 5%	$\leq 100$ mA	50 m
<b>SV - sine-wave voltage 1Vpp</b>	5 V $\pm$ 5%	$\leq 100$ mA	150 m
<b>SI - sine-current wave</b>	5 V $\pm$ 5%	$\leq 100$ mA	30 m

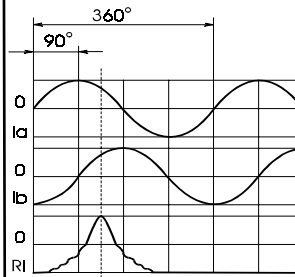
### ELECTRICAL DATA:

#### Square-wave signals - DS (RS 422A):



DS (RS - 422 A)			
$I_{sink}$	= 20 mA	$U_{OL}$	$\leq 0,5 V$
$I_{source}$	= -20mA	$U_{OH}$	$\geq 2,5 V$
$t_{LH}$	= $t_{HL}$	$\leq 30 ns$ ;	without load

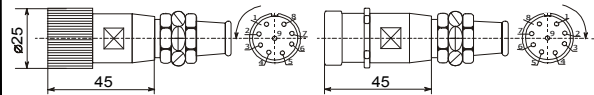
#### Sinusoidal output signals SI (11 $\mu$ A):



Amplitude of signals	
$I_b = I_a$	= 7 - 16 $\mu A_{pp}$ at load 1 kOhm
$I_{ri}$	= 2 - 8 $\mu A_{pp}$ used component
Phase - shift of signals $I_a$ and $I_b$ :	
$\varphi$	= $90^\circ \pm 10^\circ$

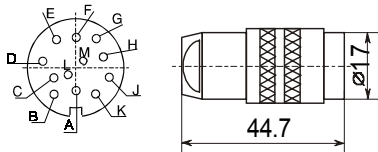
#### 9 pole connector (Contact) sine-wave output signals SI

#### connector or coupling



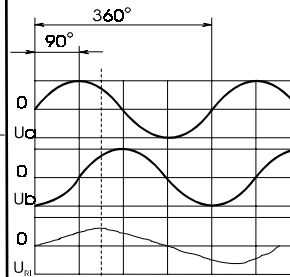
contact	1	2	3	4	5	6	7	8	9
signal	$I_a+$	$I_a-$	+5V	0V	$I_b+$	$I_b-$	$I_{ri+}$	$I_{ri-}$	shield

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



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

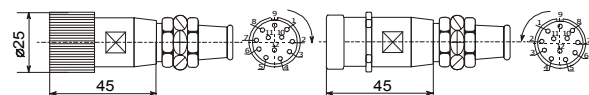
#### Sine-wave voltage signals, 1Vpp (SV):



Amplitude of signals	
$U_b = U_a$	= 0,6 - 1,2 $V_{pp}$
$U_{ri}$	= 0,5 $V_{pp}$ 0,2 - 0,8 V on termination imp. 120Ohm

#### 12 pole connector (Contact) sine-wave voltage 1Vpp signals

#### connector or coupling

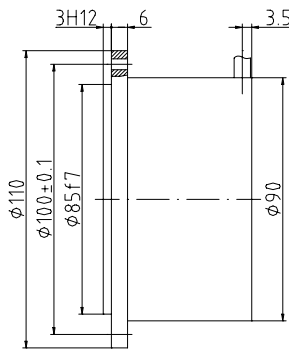
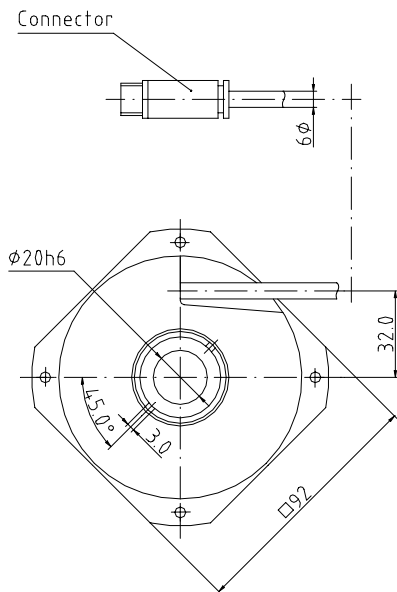


contac	1	2	3	4	5	6	7	8	9	10	11	12
signal	$\bar{B}$	sense +5V	RI	$\bar{RI}$	A	$\bar{A}$	$\bar{E}$	B	0V	sense +0V	+5V	

contact	1	2	3	4	5	6	7	8	9	10	11	12
signal	$U_b$	sense +5V	$U_{RI+}$	$U_{RI-}$	$U_{A+}$	$U_{A-}$	—	$U_{B+}$	—	0V	sense +0V	+5V

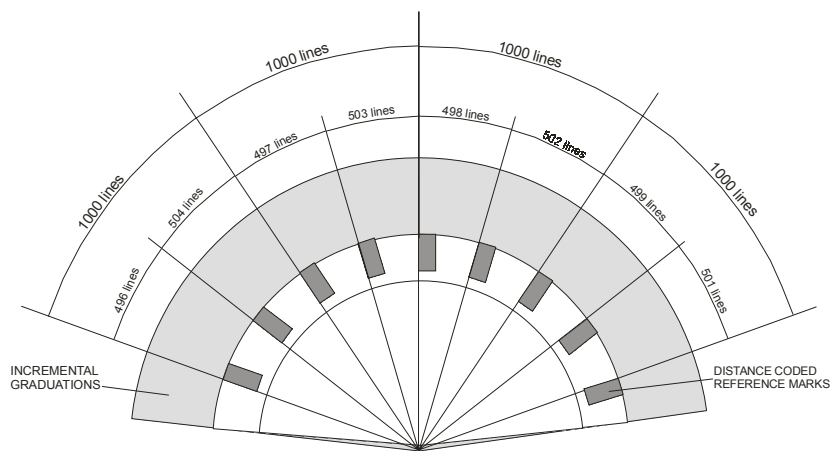
**DIMENSIONS:**

**TGR 62.6**



Cable length 3 m  
 Permanent bending radius  $\geq 100$  mm  
 Single bending radius  $\geq 40$  mm

**DISTANCE CODED REFERENCE:**



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### ORDERING DATA (example: TGR62.X<sub>1</sub>-XX<sub>2</sub>-XX<sub>3</sub>-X<sub>4</sub>-XX<sub>5</sub>-XXXXXX<sub>6</sub>-XX<sub>7</sub>-X<sub>8</sub>)

X <sub>1</sub>	<b>Version:</b>	6 ... cable radial			
XX <sub>2</sub>	<b>Voltage supply:</b>	05 ... 5V			
XX <sub>3</sub>	<b>Output signals:</b>	DS	SI	SV	
X <sub>4</sub>	<b>Reference mark:</b>	0 ... without 1 ... 1. reference 4 ... Distance Coded RI			
XX <sub>5</sub>	<b>Accuracy:</b>	7.5... ± 7,5"			
XXXXXX <sub>6</sub>	<b>No. of lines:</b>	Enter no. of lines (SI, SV) / output signal periods (DS) per revolution (see mechanical data)			
XX <sub>7</sub>	<b>Cable length:</b>	Standard 03 ... 3 m Example: 1.5 ... 1.5 m 25 ... 25 m			
X <sub>8</sub>	<b>Connector</b> is defined with electrical versions: DS or SI, other type under special requirement	1 ... Amphenol 12 pole 2 ... Amphenol 7 pole	3 ... Contact 9 pole (COUPLING) 4 ... Contact 12 pole (CONNECTOR) 5 ... Contact 9 pole (CONNECTOR) 6 ... Contact 12 pole (COUPLING)	7 ... D-Sub 9 pole	9 ... other(specify) 0... without connector

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