

# Incremental Rotary Encoder G36

## Shaft: Type S / L



- Housing diameter: 36,5 mm
- Shaft: 4 ... 6,35 mm
- Hollow shaft: 4 ... 8 mm
- Line counts: 36 ... 4.096
- Output signals: RS422, TTL, OC, KS, KI, 1Vpp, 11µApp
- Cable output: axial or radial

## Hollow shaft: Type W



## Mechanical Data

G36	Shaft Type S	Shaft Type L	Hollow shaft Type W
	Shaft / Hollow shaft	6 mm	6,35 mm
Weight	ca. 85 g	ca. 85 g	ca. 85 g
Accuracy (up to line count 2500)	$< \pm \frac{360^\circ}{\text{Line counts} \times 20}$	$< \pm \frac{360^\circ}{\text{Line counts} \times 20}$	$< \pm \frac{360^\circ}{\text{Line counts} \times 20}$
Mech. permissible speed	max. 12.000 min <sup>-1</sup>	max. 12.000 min <sup>-1</sup>	max. 12.000 min <sup>-1</sup>
Starting torque (25 °C)	< 0,001 Nm	< 0,001 Nm	< 0,001 Nm
Shaft load at 12.000 min <sup>-1</sup>	5 N axial; 10 N radial	5 N axial; 10 N radial	---
Rotor inertia	0,15 x 10 <sup>-6</sup> kgm <sup>2</sup>	0,15 x 10 <sup>-6</sup> kgm <sup>2</sup>	0,20 x 10 <sup>-6</sup> kgm <sup>2</sup>
Vibration	100 m/s <sup>2</sup> ; higher upon request	100 m/s <sup>2</sup> ; higher upon request	100 m/s <sup>2</sup> ; higher upon request
Shock	300 m/s <sup>2</sup> ; higher upon request	300 m/s <sup>2</sup> ; higher upon request	300 m/s <sup>2</sup> ; higher upon request
Operating temperature	-25°C ... +85°C; -25°C ... +70°C for QI	-25°C ... +85°C; -25°C ... +70°C for QI	-25°C ... +85°C; -25°C ... +70°C for QI
Protection class	IP 64	IP 64	IP 64

## Line counts

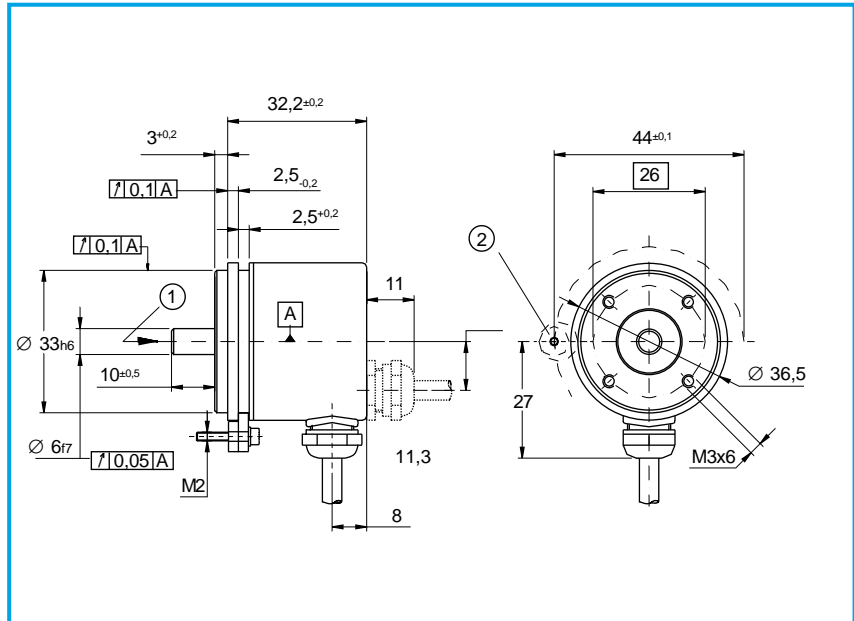
36	100	200	250	360	400	500	1000	1024
1250	1440	1500	2000	2048	2500	3600	4096	others upon request

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### Dimensions (mm)

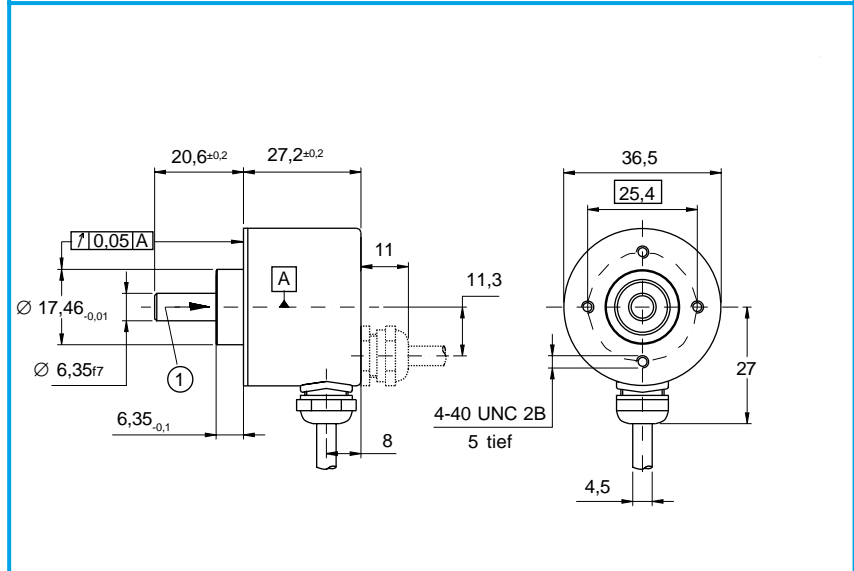
#### G 36 S

- optional: sealed bearing
- cable output: radial or axial
- cable with PG or connector
- optional: square flange receptacle
- ② optional: servo clamps



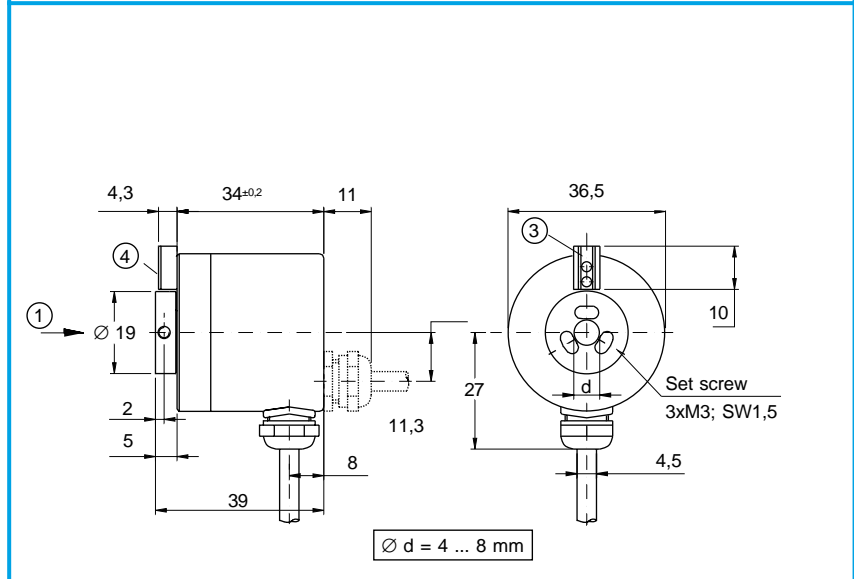
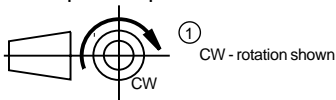
#### G 36 L

- optional: sealed bearing
- cable output: radial or axial
- cable with PG or connector
- optional: square flange receptacle



#### G 36 W

- hollow shaft type (blind hole)
- optional: hollow through shaft for QI
- cable output: radial or axial
- cable with PG or connector
- axial backlash (shaft): max. ± 0,5 mm
- ③ coupling pin 3m6 x 10 included
- ④ other torque coupling designs: upon request



### Electrical Data

G36	Type S	Type L	Type W
Supply voltage	5 V: LD, SI 5 V o. 8 ... 30 V: IX, TL, OC, QI 8 ... 15 V: KI 8 ... 30 V: KS	5 V: LD, SI 5 V o. 8 ... 30 V: IX, TL, OC, QI 8 ... 15 V: KI 8 ... 30 V: KS	5 V: LD, SI 5 V o. 8 ... 30 V: IX, TL, OC, QI 8 ... 15 V: KI 8 ... 30 V: KS
Current requirement (without load)	max. 100 mA: LD, IX, KS, KI, TL, OC, QI, SI	max. 100 mA: LD, IX, KS, KI, TL, OC, QI, SI	max. 100 mA: LD, IX, KS, KI, TL, OC, QI, SI
Output load	± 20 mA (RS422): LD, IX 40 mA: OC 50 mA: KS, KI 40 mA (3,3 kOhm): TL 8 mA (120 Ohm): SI 11µAss (1 kOhm): QI	± 20 mA (RS422): LD, IX 40 mA: OC 50 mA: KS, KI 40 mA (3,3 kOhm): TL 8 mA (120 Ohm): SI 11µAss (1 kOhm): QI	± 20 mA (RS422): LD, IX 40 mA: OC 50 mA: KS, KI 40 mA (3,3 kOhm): TL 8 mA (120 Ohm): SI 11µAss (1 kOhm): QI
Output frequency	0 ... 100 kHz: TL, OC 0 ... 160 kHz (-3dB): QI, SI 0 ... 300 kHz: LD, KS, KI 0 ... 400 kHz: IX	0 ... 100 kHz: TL, OC 0 ... 160 kHz (-3dB): QI, SI 0 ... 300 kHz: LD, KS, KI 0 ... 400 kHz: IX	0 ... 100 kHz: TL, OC 0 ... 160 kHz (-3dB): QI, SI 0 ... 300 kHz: LD, KS, KI 0 ... 400 kHz: IX
Cable length	max. 5 m: QI max. 30 m: TL, OC max. 50 m: KS, KI max. 100 m: LD, IX max. 150 m: SI	max. 5 m: QI max. 30 m: TL, OC max. 50 m: KS, KI max. 100 m: LD, IX max. 150 m: SI	max. 5 m: QI max. 30 m: TL, OC max. 50 m: KS, KI max. 100 m: LD, IX max. 150 m: SI
Interpolation	5-fold: IE; 10-fold: IM 25-fold: IO; 50-fold: IP	5-fold: IE; 10-fold: IM 25-fold: IO; 50-fold: IP	5-fold: IE; 10-fold: IM 25-fold: IO; 50-fold: IP
Zero index	5 = Z „high“ if A + B „high“ others upon request	5 = Z „high“ if A + B „high“ others upon request	5 = Z „high“ if A + B „high“ others upon request

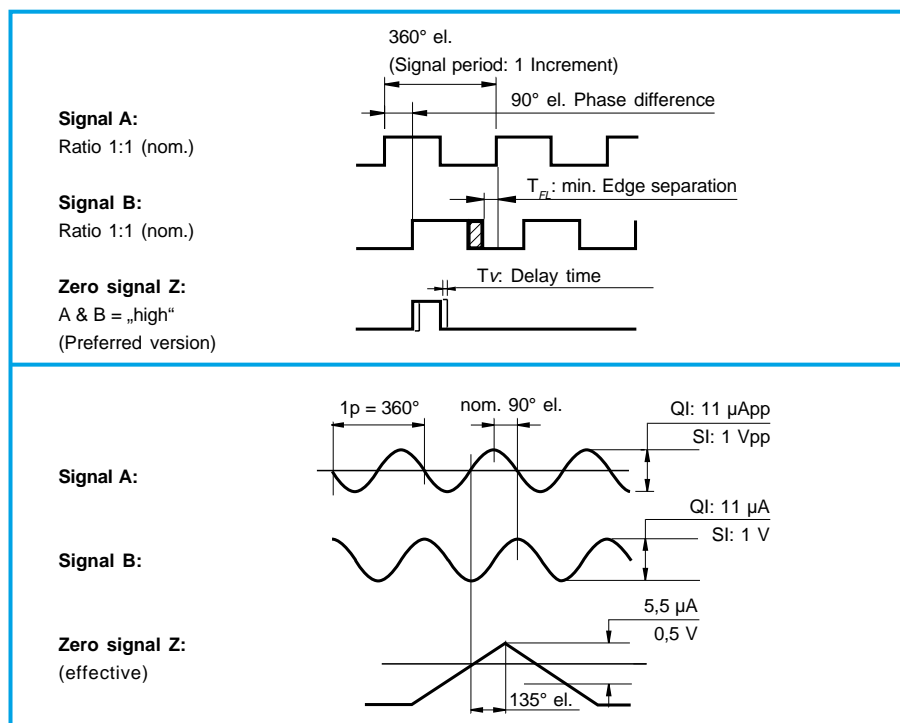
### Output Signals

#### Version:

- LD = Line driver RS422
- IX = LD with interpolation
- PP = Push pull with short-circuit protection
- TL = TTL compatible
- OC = Open collector

#### Version:

- QI = 11 µApp at 1 kOhm load
- SI = 1 Vpp at 120 Ohm load

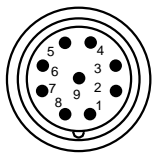


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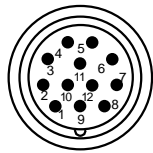
### Connector-Terminal and Cable Designation

G 36	Output circuit			
	OC / TL / KS		LD / IX / KI	
Function / Signal	12-pin	cable Pur 10 x 0,14	12-pin	cable Pur 10 x 0,14
Signal A	5	brown	5	brown
Signal $\bar{A}$	-	-	6	green
Signal B	8	grey	8	grey
Signal $\bar{B}$	-	-	1	pink
Signal Z	3	red	3	red
Signal $\bar{Z}$	-	-	4	black
V <sub>CC</sub>	12	blue	12	blue
V <sub>CC Sense</sub>	2	violet	2	violet
0 Volts	10	white	10	white
0 Volts <sub>Sense</sub>	11	yellow	11	yellow
Shield	9	white-blue	9	white-blue

G 36	Output circuit			
	QI		SI	
Function / Signal	9-pin	cable Pur 10 x 0,14	9-pin	cable Pur 10 x 0,14
Signal A +	1	green	5	brown
Signal A -	2	yellow	6	green
Signal B +	5	blue	8	grey
Signal B -	6	red	1	pink
Signal Z +	7	grey	3	red
Signal Z -	8	pink	4	black
V <sub>CC</sub>	3	brown	12	blue
V <sub>CC Sense</sub>	-	-	2	violet
0 Volts	4	white	10	white
0 Volts <sub>Sense</sub>	-	-	11	yellow
Shield	9	white-blue	9	Case
External shield	-	Case		



**Pin plug 9-pin:**  
Metal: RC-09P1N1280EF  
Plastic: RC-09P2N12K0EF



**Pin plug 12-pin:**  
Metal: RC-12P2N1280EF  
Plastic: RC-12P1N12K0EF

**Socket coupling for pin plug:**  
Metall: RC-09S2N1290EF  
Kunststoff: RC-09S2N12M0EF

**Socket coupling for pin plug:**  
Metall: RC-12S1N1290EF  
Kunststoff: RC-12S1N12M0EF

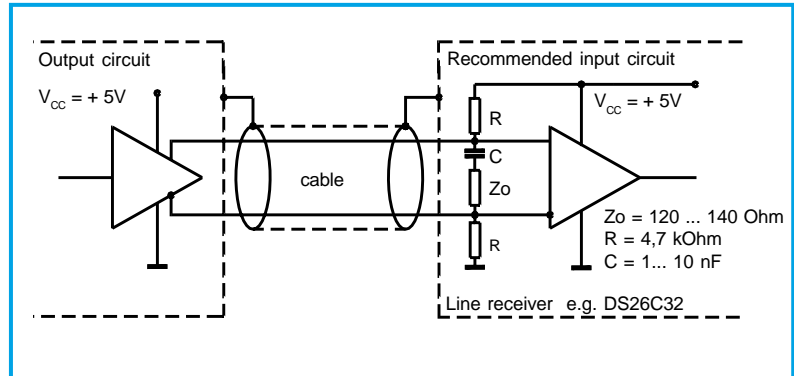
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### Recommended input circuitry of subsequent electronics LD and IX: Line driver RS 422 A

Operating voltage:  $5\text{ V} \pm 5\%$   
 Current requirement: max. 100 mA (without load)  
 Output signals: A,  $\bar{A}$ , B,  $\bar{B}$ , Z,  $\bar{Z}$   
 Max. output frequency: 300 kHz for LD  
 400 kHz for IX

Min. edge separation:  $TFL \geq 0,25\ \mu\text{s}$  (400 kHz)  
 Level (RS422):  $VH \geq 2,5\text{ V}$  ( $IH = -20\text{ mA}$ )  
 $VL \leq 0,5\text{ V}$  ( $IL = 20\text{ mA}$ )

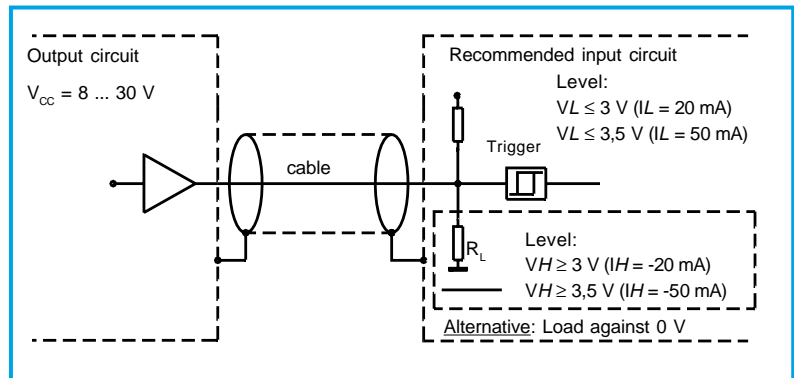
Max. current load cap.:  $I_{max} \leq \pm 20\text{ mA}$  per output  
 Delay time:  $TV \leq 50\text{ ns}$   
 Switching times: rise / fall times:  $\leq 100\text{ ns}$   
 Cable length: max. 100 m  
 Operating temperature:  $-25\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}$



### KS: Push pull output with short-circuit protection

Operating voltage: 8 ... 30 V  
 Current requirement: max. 100 mA (without load)  
 Output signals: A, B, Z  
 max. output frequency: 300 kHz

Min. edge separation:  $TFL \geq 0,9\ \mu\text{s}$  (400 kHz)  
 Max. current load cap.:  $I_{max} \leq 50\text{ mA}$  per output  
 Delay time:  $TV \leq 400\text{ ns}$   
 Switching times: rise / fall times:  $\leq 350\text{ ns}$   
 (1 m cable and  $I_{out} = 50\text{ mA}$ )  
 Cable length: max. 50 m  
 Operating temperature:  $-25\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}$

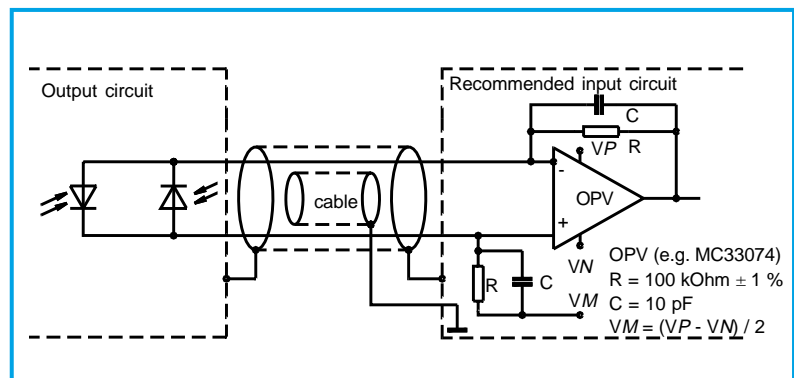


### QI: Current interface 11 $\mu\text{App}$

Operating voltage:  $5\text{ V} \pm 5\%$  or 8 ... 30 V  
 Current requirement: max. 100 mA  
 Output signals: A+, A-, B+, B-, Z+, Z-  
 Limit frequency (-3dB): max. 160 kHz

Signal level at a load of 1 kOhm: track signals:  
 A, B  $\geq 11\ \mu\text{App}$  (7 ... 16  $\mu\text{App}$ )  
 index signal (effective signal):  
 Z  $\geq 5,5\ \mu\text{A}$  (2 ... 8,5  $\mu\text{A}$ )

Cable length: max. 5 m  
 Operating temperature:  $-25\text{ }^\circ\text{C} \dots +70\text{ }^\circ\text{C}$



### SI: Voltage interface 1 Vpp

Operating voltage:  $5\text{ V} \pm 5\%$   
 Current requirement: max. 100 mA  
 Output signals: A+, A-, B+, B-, Z+, Z-  
 Limit frequency (-3dB): max. 160 kHz

Signal level at a load of  $Z_o = 120\ \text{Ohm}$ : track signals:  
 A, B  $\sim 1\text{ Vpp}$  (0,8 ... 1,2 Vpp)  
 index signal (effective signal):  
 Z  $\sim 0,5\text{ V}$  (0,2 ... 0,85 V)

Cable length: max. 150 m  
 Operating temperature:  $-25\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}$

