

# Combination

## Encoder and tachogenerator in combination

### Solid shaft with EURO flange B10

100...5000 pulses per revolution

#### FOG 9 + GT 7



FOG 9 + GT 7

#### Features

- Compact, robust die-cast housing
- Flange socket with metal mating connector
- EURO flange B10, solid shaft  $\varnothing 11$  mm
- Temperature compensation of tacho voltage as standard
- Open circuit voltage 10...60 mV per rpm

#### Optional

- Connecting cable
- Function control with EMS (Enhanced Monitoring System)

#### Technical data - electrical ratings (tachogenerator)

Reversal tolerance	$\leq 0.1$ %
Linearity tolerance	$\leq 0.15$ %
Temperature coefficient	$\pm 0.05$ %/K (open-circuit)
Isolation class	B
Calibration tolerance	$\pm 5$ %
Climatic test	Humid heat, constant (IEC 60068-2-3, Ca)
Armature-circuit time-constant	$< 4$ $\mu$ s

#### FOG 9 + GT 7.08

Performance	0.3 W (speed $\geq 5000$ rpm)
Open-circuit voltage	10...30 mV per rpm

#### FOG 9 + GT 7.16

Performance	0.6 W (speed $\geq 5000$ rpm)
Open-circuit voltage	40...60 mV per rpm

#### Technical data - electrical ratings (encoder)

Voltage supply	9...30 VDC; 5 VDC $\pm 5$ %
Consumption w/o load	$\leq 100$ mA
Pulses per revolution	100...5000
Phase shift	$90^\circ \pm 20^\circ$
Scan ratio	40...60 %
Reference signal	Zero pulse, width $90^\circ$
Output frequency	$\leq 120$ kHz $\leq 300$ kHz (on request)
Output signals	K1, K2, K0 + inverted Error output (only EMS)
Output stages	HTL; TTL/RS422

#### Technical data - mechanical design

Size (flange)	$\varnothing 115$ mm
Shaft type	$\varnothing 11$ mm solid shaft
Shaft loading	$\leq 200$ N axial $\leq 300$ N radial
Flange	EURO flange B10
Protection DIN EN 60529	IP 55
Operating speed	$\leq 10000$ rpm
Operating torque typ.	6 Ncm
Rotor moment of inertia	160 gcm <sup>2</sup>
Materials	Housing: aluminium die-cast Shaft: stainless steel
Operating temperature	$-30...+100$ $^\circ$ C $-25...+100$ $^\circ$ C ( $> 3072$ pulses per revolution)
Resistance	IEC 60068-2-6 Vibration 10 g, 10-2000 Hz IEC 60068-2-27 Shock 100 g, 6 ms
Connection	Flange connector M23, 12-pin Screw terminal connector Connecting cable (option)
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approval	CE

#### FOG 9 + GT 7.08

Weight approx.	1.3 kg
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#### FOG 9 + GT 7.16

Weight approx.	1.6 kg
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**FOG 9 + GT 7**

**Part number**

**Incremental encoder with tachogenerator**

FOG9  DN   +GT7.08L/4

Open-circuit voltage  
 10 10 mV per rpm  
 20 20 mV per rpm  
 30 30 mV per rpm

Voltage supply / signals  
 I 9...30 VDC / output circuit HTL with inverted signals  
 TTL 5 VDC / output circuit TTL with inverted signals  
 R 9...30 VDC / output circuit TTL with inverted signals

Pulse number - see table

Output signals  
 DN K1, K2, K0

EMS - Enhanced Monitoring System  
 Without EMS  
 2 With EMS

**Pulse number**

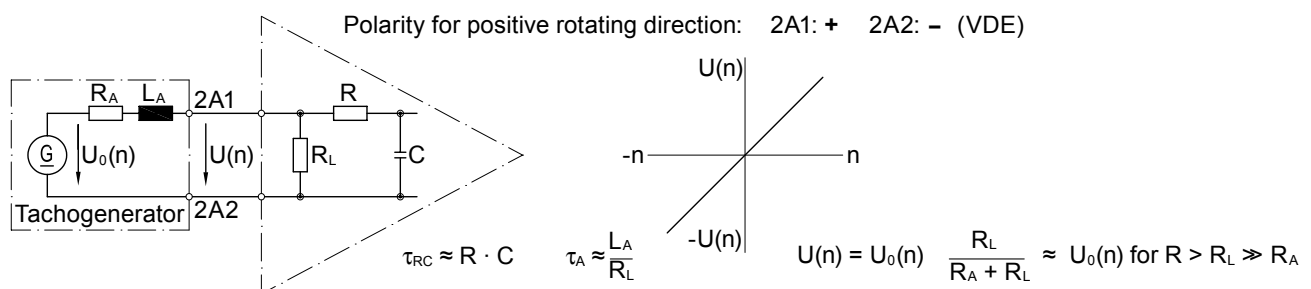
100	200	400	900	2048
120	250	500	1000	2500
128	256	512	1024	3072
180	300	600	1200	4096
192	360	720	1250	5000

Other pulse numbers on request.

**Data according to type**

Type	Off-load voltage $U_0$ [mV/rpm]	Minimum load required depending on speed range [rpm]			Maximum operating speed $n_{max}$ [rpm]	Armature resistance $R_A$ (20°C) [Ω]	Armature inductance $L_A$ [mH]
		0-3000	0-6000	0- $n_{max}$			
GT7.08L/410	10	$R_L \geq 5$ [kΩ]	$R_L \geq 12$ [kΩ]	$R_L \geq 27$ [kΩ]	9000	60	20
GT7.08L/420	20	$R_L \geq 20$ [kΩ]	$R_L \geq 48$ [kΩ]	$R_L \geq 108$ [kΩ]	9000	230	80
GT7.08L/430	30	$R_L \geq 45$ [kΩ]	$R_L \geq 108$ [kΩ]	$R_L \geq 243$ [kΩ]	9000	550	180
Superimposed ripple (for $\tau_{RC} = 0.3$ ms):		$\leq 0.6\%$ (peak-peak)			$\leq 0.25\%$ (rms)		

**Replacement switching diagram**



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Part number			
Incremental encoder with tachogenerator			
FOG9	DN		+GT7.16L/4
			Open-circuit voltage
			40 40 mV per rpm
			60 60 mV per rpm
			Voltage supply / signals
			I 9...30 VDC / output circuit HTL with inverted signals
			TTL 5 VDC / output circuit TTL with inverted signals
			R 9...30 VDC / output circuit TTL with inverted signals
			Pulse number - see table
			Output signals
			DN K1, K2, K0
			EMS - Enhanced Monitoring System
			Without EMS
			.2 With EMS

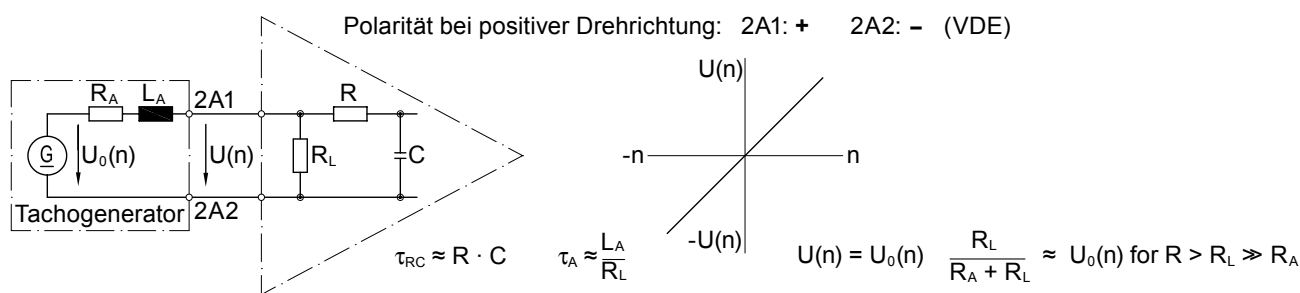
Pulse number				
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Other pulse numbers on request.

### Data according to type

Type	Off-load voltage	Minimum load required depending on speed range [rpm]			Maximum operating speed	Armature resistance	Armature inductance
		0-3000	0-6000	0-n <sub>max</sub>			
	U <sub>0</sub> [mV/rpm]	R <sub>L</sub> [kΩ]	R <sub>L</sub> [kΩ]	R <sub>L</sub> [kΩ]	n <sub>max</sub> [rpm]	R <sub>A</sub> (20°C) [Ω]	L <sub>A</sub> [mH]
GT7.16L/440	40	≥40	≥96	≥216	9000	410	160
GT7.16L/460	60	≥90	≥215	≥223	6100	760	360
Superimposed ripple (for τ <sub>RC</sub> = 0.3 ms):		≤0.6% (peak-peak)			≤0.25% (rms)		

### Replacement switching diagram



# Combination

## Encoder and tachogenerator in combination

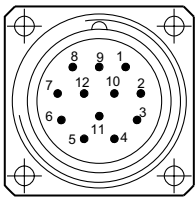
### Solid shaft with EURO flange B10

### 100...5000 pulses per revolution

FOG 9 + GT 7

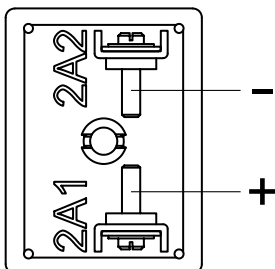
#### Terminal assignment

View A		Connecting cable assignment
Pin	Assignment	Cable colour
1	$\overline{K2}$ (K2 inv.)	Yellow
2	Do not use	---
3	K0 (Zero pulse)	Grey
4	$\overline{K0}$ (Zero pulse inv.)	Pink
5	K1	White
6	$\overline{K1}$ (K1 inv.)	Brown
7	Do not use (Option EMS: $\overline{Err}$ )	---
8	K2	Green
9	Do not use (Option EMS: 0 V)	---
10	0 V	Blue
11	Do not use	---
12	+UB	Red



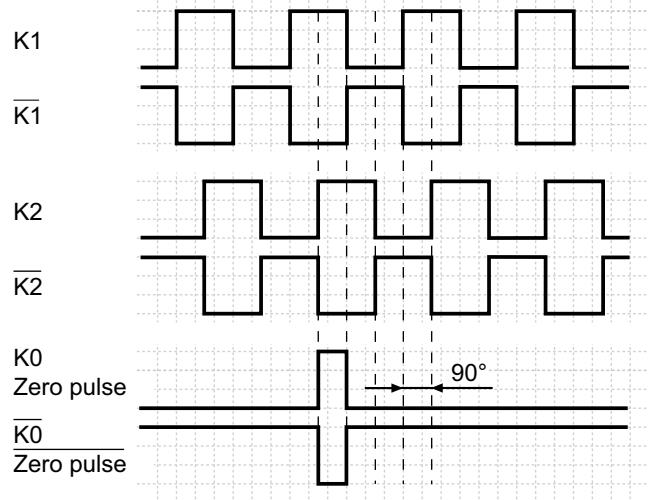
#### View A - Connecting terminal GT 7

Polarity for positive rotating direction



#### Output signals

At positive rotating direction



#### Option EMS: LED status / Error output

Flash light red*	Error of signal sequence, zero pulse or pulses (Error output = HIGH-LOW alternation)
Red	Overload output driver (Error output = LOW)
Flash light green	Encoder o.k., rotating (Error output = HIGH)
Green	Encoder o.k., stopped (Error output = HIGH)
No light	No output voltage connection or wrong connection (Error output = LOW)

\* Only at rotating encoder

#### Accessories

##### Connectors and cables

HEK 8 Sensor cable for encoders

##### Mounting accessories

K 35 Spring washer coupling for solid shaft  $\varnothing 6...12$  mm

K 50 Spring washer coupling for solid shaft  $\varnothing 11...16$  mm

K 60 Spring washer coupling for solid shaft  $\varnothing 11...22$  mm

##### Diagnostic accessories

HENQ 1100 Analyzer for encoders

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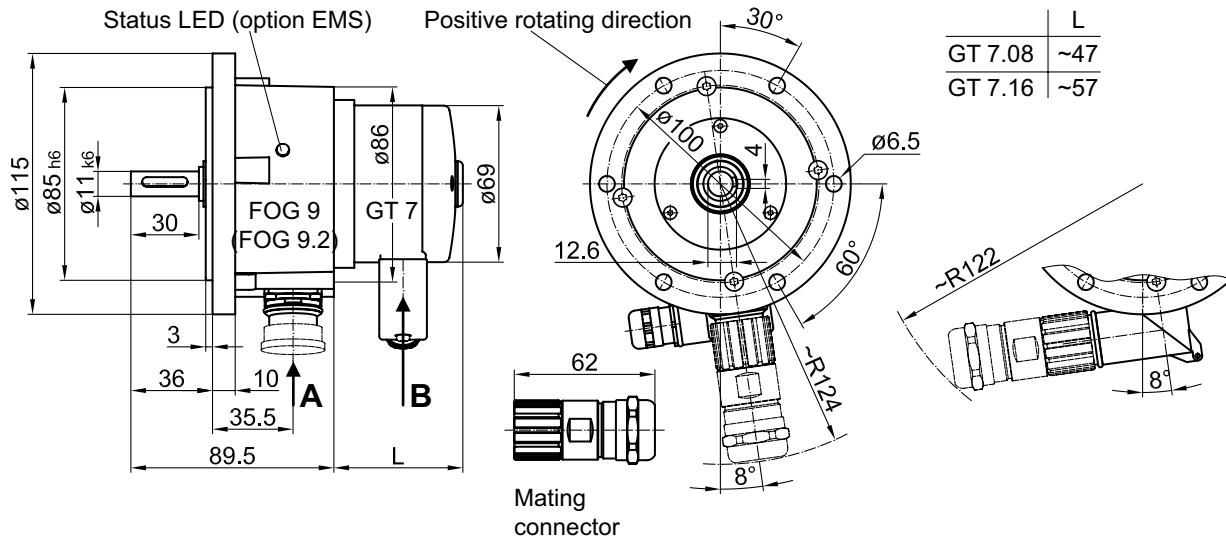
### Solid shaft with EURO flange B10

100...5000 pulses per revolution

## FOG 9 + GT 7

### Dimensions

#### FOG 9 + GT 7 (FOG 9.2 + GT 7) - Version with flange connector



#### FOG 9 + GT 7 - Version with connecting cable

